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(54) Title: MUTATIONS IN ION CHANNELS

(57) **Abstract:** A method of identifying a subject predisposed to a disorder associated with ion channel dysfunction, comprising ascertaining whether at least one of the genes encoding ion channel subunits in said subject has undergone a mutation event as set forth in one of SEQ ID Numbers: 1-72.

MUTATIONS IN ION CHANNELS

Technical Field

The present invention is concerned with mutations in
5   proteins having biological functions as ion channels and,
more particularly, with such mutations where they are
associated with diseases such as epilepsy and disorders
associated with ion channel dysfunction including, but not
restricted to, hyper- or hypo-kalemic periodic paralysis,
10   myotonias, malignant hyperthermia, myasthenia, cardiac
arrhythmias, episodic ataxia, migraine, Alzheimer's
disease, Parkinson's disease, schizophrenia,
hyperekplexia, anxiety, depression, phobic obsessive
symptoms, neuropathic pain, inflammatory pain,
15   chronic/acute pain, Bartter's syndrome, polycystic kidney
disease, Dent's disease, hyperinsulinemic hypoglycemia of
infancy, cystic fibrosis, congenital stationary night
blindness and total colour-blindness.

20   Background Art

Epilepsies constitute a diverse collection of brain
disorders that affect about 3% of the population at some
time in their lives (Annegers, 1996). An epileptic seizure
can be defined as an episodic change in behaviour caused
25   by the disordered firing of populations of neurons in the
central nervous system. This results in varying degrees of
involuntary muscle contraction and often a loss of
consciousness. Epilepsy syndromes have been classified
into more than 40 distinct types based upon characteristic
30   symptoms, types of seizure, cause, age of onset and EEG
patterns (Commission on Classification and Terminology of
the International League Against Epilepsy, 1989). However
the single feature that is common to all syndromes is the
persistent increase in neuronal excitability that is both
35   occasionally and unpredictably expressed as a seizure.

A genetic contribution to the aetiology of epilepsy
has been estimated to be present in approximately 40% of

affected individuals (Gardiner, 2000). As epileptic seizures may be the end-point of a number of molecular aberrations that ultimately disturb neuronal synchrony, the genetic basis for epilepsy is likely to be

5 heterogeneous. There are over 200 Mendelian diseases which include epilepsy as part of the phenotype. In these diseases, seizures are symptomatic of underlying neurological involvement such as disturbances in brain structure or function. In contrast, there are also a

10 number of "pure" epilepsy syndromes in which epilepsy is the sole manifestation in the affected individuals. These are termed idiopathic and account for over 60% of all epilepsy cases.

Idiopathic epilepsies have been further divided into

15 partial and generalized sub-types. Partial (focal or local) epileptic fits arise from localized cortical discharges, so that only certain groups of muscles are involved and consciousness may be retained. However, in generalized epilepsy, EEG discharge shows no focus such

20 that all subcortical regions of the brain are involved. Although the observation that generalized epilepsies are frequently inherited is understandable, the mechanism by which genetic defects, presumably expressed constitutively in the brain, give rise to partial seizures is less clear.

25 The molecular genetic era has resulted in spectacular advances in classification, diagnosis and biological understanding of numerous inherited neurological disorders including muscular dystrophies, familial neuropathies and spinocerebellar degenerations. These disorders are all

30 uncommon or rare and have simple Mendelian inheritance. In contrast, common neurological diseases like epilepsy, have complex inheritance where they are determined by multiple genes sometimes interacting with environmental influences. Molecular genetic advances in disorders with

35 complex inheritance have been far more modest to date (Todd, 1999).

Most of the molecular genetic advances have occurred by a sequential three stage process. First a clinically homogeneous disorder is identified and its mode of inheritance determined. Second, linkage analysis is performed on carefully characterized clinical populations with the disorder. Linkage analysis is a process where the chromosomal localization of a particular disorder is narrowed down to approximately 0.5% of the total genome. Knowledge of linkage imparts no intrinsic biological insights other than the important clue as to where to look in the genome for the abnormal gene. Third, strategies such as positional cloning or the positional candidate approach are used to identify the aberrant gene and its specific mutations within the linked region (Collins, 1995).

Linkage studies in disorders with complex inheritance have been bedevilled by negative results and by failure to replicate positive findings. A sense of frustration permeates current literature in the genetics of complex disorders. Carefully performed, large scale studies involving hundreds of sibpairs in disorders including multiple sclerosis and diabetes have been essentially negative (Bell and Lathrop, 1996; Lernmark and Ott, 1998). An emerging view is that such disorders are due to the summation of many genes of small effect and that identification of these genes may only be possible with very large-scale association studies. Such studies on a genome-wide basis are currently impossible due to incomplete marker sets and computational limitations.

The idiopathic generalized epilepsies (IGE) are the most common group of inherited human epilepsy and do not have simple inheritance. Like other complex disorders, linkage studies in IGE have generated controversial and conflicting claims. Previous authors have suggested the possibility of multifactorial, polygenic, oligogenic or two locus models for the disease (Andermann, 1982; Doose

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and Baier, 1989; Greenberg et al., 1988a; 1992; Janz et al., 1992).

Two broad groups of IGE are now known - the classical idiopathic generalized epilepsies (Commission on
5   Classification and Terminology of the International League Against Epilepsy, 1989) and the newly recognized genetic syndrome of generalized epilepsy with febrile seizures plus (GEFS⁺) (Scheffer and Berkovic, 1997; Singh et al., 1999).

10   The classical IGEs are divided into a number of clinically recognizable but overlapping sub-syndromes including childhood absence epilepsy, juvenile absence epilepsy, juvenile myoclonic epilepsy etc (Commission on Classification and Terminology of the International League
15   Against Epilepsy, 1989; Roger et al., 1992). The sub-syndromes are identified by age of onset and the pattern of seizure types (absence, myoclonus and tonic-clonic). Some patients, particularly those with tonic-clonic seizures alone do not fit a specifically recognized sub-
20   syndrome. Arguments for regarding these as separate syndromes, yet recognizing that they are part of a neurobiological continuum, have been presented previously (Berkovic et al. 1987; 1994; Reutens and Berkovic, 1995).

GEFS⁺ was originally recognized through large multi-
25   generation families and comprises a variety of sub-syndromes. Febrile seizures plus (FS⁺) is a sub-syndrome where children have febrile seizures occurring outside the age range of 3 months to 6 years, or have associated febrile tonic-clonic seizures. Many family members have a
30   phenotype indistinguishable from the classical febrile convulsion syndrome and some have FS⁺ with additional absence, myoclonic, atonic, or complex partial seizures. The severe end of the GEFS⁺ spectrum includes myoclonic-astatic epilepsy.

35   The cumulative incidence for epilepsy by age 30 years (proportion suffering from epilepsy at some time) is 1.5% (Hauser et al., 1993). Accurate estimates for the

cumulative incidence of the IGEs are unavailable. In epidemiological studies where attempts are made to subclassify epilepsies, rather few cases of IGE are diagnosed, and many cases are unclassified. This is probably because cases are rarely directly examined by epileptologists. In clinic- or office-based series seen by experts, most cases are classifiable and IGEs account for about 25% of cases. This suggests that about 0.3% of the population suffer from IGE at some time.

In outbred populations many patients with classical IGE appear to be sporadic as siblings and parents are usually unaffected. Systematic EEG studies on clinically unaffected family members show an increase in age-dependent occurrence of generalized epileptiform discharges compared to controls. In addition, to the approximate 0.3% of the population with clinical IGE, systematic EEG studies suggest that about 1% of healthy children have generalized epileptiform discharges while awake (Cavazzuti et al., 1980; Okubo et al., 1994).

Approximately 5-10% of first degree relatives of classical IGE probands have seizures with affected relatives usually having IGE phenotypes or febrile seizures. While nuclear families with 2-4 affected individuals are well recognized and 3 generation families or grandparent-grandchild pairs are occasionally observed (Italian League Against Epilepsy Genetic Collaborative Group, 1993), families with multiple affected individuals extending over 4 or more generations are exceptionally rare.

For GEFS[+], however, a number of large multi-generation families showing autosomal dominant inheritance with incomplete penetrance are known. Similar to classical IGE, analysis of sporadic cases and small families with GEFS[+] phenotypes does not suggest simple Mendelian inheritance. Indeed, bilineal inheritance, where there is a history of epilepsy on maternal and paternal sides, is observed in both GEFS[+] and classical IGE families (Singh et al., 1999;

Italian League Against Epilepsy Genetic Collaborative Group, 1993).

Within single families with classical IGE or GEFS⁺, affected individuals often have different sub-syndromes.
5   The closer an affected relative is to the proband, the more similar are their sub-syndromes, and siblings often have similar sub-syndromes (Italian League Against Epilepsy Genetic Collaborative Group, 1993). Less commonly, families are observed where most, or all, known
10   affected individuals have one classical IGE sub-syndrome such as childhood absence epilepsy or juvenile myoclonic epilepsy (Italian League Against Epilepsy Genetic Collaborative Group, 1993).

Importantly, sub-syndromes are identical in affected
15   monozygous twins with IGE. In contrast, affected dizygous twins, may have the same or different sub-syndromes. Classical IGE and GEFS⁺ sub-syndromes tend to segregate separately (Singh et al., 1999).

In some inbred communities, pedigree analysis
20   strongly suggests recessive inheritance for juvenile myoclonic epilepsy and other forms of IGE (Panayiotopoulos and Obeid, 1989; Berkovic et al., 2000). In such families, sub-syndromes are much more similar in affected siblings than in affected sib-pairs from outbred families.
25   Recently, a family with an infantile form of IGE with autosomal recessive inheritance, confirmed by linkage analysis, was described in Italy (Zara et al., 2000).

Most work on the molecular genetics of classical IGEs has been done on the sub-syndrome of juvenile myoclonic
30   epilepsy where a locus in proximity or within the HLA region on chromosome 6p was first reported in 1988 (Greenberg et al., 1988b). This finding was supported by two collaborating laboratories, in separate patient samples, and subsequently three groups provided further
35   evidence for a 6p locus for juvenile myoclonic epilepsy in some, but not all, of their families. However, genetic defects have not been found and the exact locus of the

gene or genes, in relationship to the HLA region, remains controversial. Strong evidence for linkage to chromosome 6 also comes from a study of a single large family with juvenile myoclonic epilepsy, but in this pedigree the locus is well outside the HLA region. A locus on chromosome 15q has also been suggested for juvenile myoclonic epilepsy, but was not confirmed by two other studies.

In general, the results of studies of the putative chromosomal 6p locus in the HLA region in patients with absence epilepsies or other forms of idiopathic generalized epilepsies have been negative. The major exception is that study of probands with tonic-clonic seizures on awakening, a sub-syndrome closely related to juvenile myoclonic epilepsy, suggests linkage to 6p.

Linkage for classical remitting childhood absence epilepsy remains elusive, but in a family with persisting absence evolving into a juvenile myoclonic epilepsy phenotype, linkage to chromosome 1p has been claimed. An Indian pedigree with persisting absence and tonic-clonic seizures may link to 8q24. Linkage to this region was also suggested by a non-parametric analysis in IGE, irrespective of subsyndrome, but was not confirmed in another study. Other loci for IGEs that have been reported in single studies include 3p14, 8p, 18 and possibly 5p. The unusual example of recessively inherited infantile onset IGE described in Italy maps to 16p in a single family.

Thus, like most disorders with complex inheritance, the literature on genetics of classical IGEs is confusing and contradictory. Some, and perhaps much, of this confusion is due to heterogeneity, with the likelihood of a number of loci for IGEs. The studies reviewed above were principally performed on multiple small families, so heterogeneity within and between samples is probable. Whether all, some, or none of the linkages reported above will be found to harbour relevant genes for IGE remains to

be determined. Most of the studies reviewed above used analysis methods assuming Mendelian inheritance, an assumption that is not correct for outbred communities. Some studies used multiple models (autosomal recessive, autosomal dominant). Although parametric linkage analysis may be reliable in some circumstance of analyzing complex disease, it can lead to spurious findings as highlighted by the literature on linkage in major psychoses (Risch and Botstein, 1996).

In so far as GEFS$^+$ is concerned, linkage analysis on rare multi-generation large families with clinical evidence of a major autosomal dominant gene have demonstrated loci on chromosomes 19q and 2q. Both the 19q and 2q GEFS$^+$ loci have been confirmed in independently ascertained large families, and genetic defects have been identified. Families linked to 19q are known and a mutation in the gene for the β1 subunit of the neuronal sodium channel (SCN1B) has been identified (Wallace et al., 1998). This mutation results in the loss of a critical disulphide bridge of this regulatory subunit and causes a loss of function *in vitro*. Families linked to 2q are also known and mutations in the pore-forming α subunit of the neuronal sodium channel (SCN1A) have been identified (PCT/AU01/01648; Wallace et al., 2001*b*; Escayg et al., 2000). Studies on the more common small families with GEFS$^+$ have not revealed these or other mutations to date.

In addition to the *SCN1B* and *SCN1A* mutations in GEFS$^+$, four other gene defects have been discovered for human idiopathic epilepsies through the study of large families. Mutations in the alpha-4 subunit of the neuronal nicotinic acetylcholine receptor (CHRNA4) occur in the focal epilepsy syndrome of autosomal dominant nocturnal frontal lobe epilepsy (Australian patent AU-B-56247/96; Steinlein et al., 1995). Mutations in the gamma-2 subunit of the GABA$_A$ receptor (GABRG2) have been identified in childhood absence epilepsy, febrile seizures (including febrile

seizures plus) and myoclonic epilepsy (PCT/AU01/00729;
Wallace et al., 2001a). Finally, mutations in two
potassium channel genes (KCNQ2 and KCNQ3) were identified
in benign familial neonatal convulsions (Singh et al.,
5 1998; Biervert et al., 1998; Charlier et al., 1998).
Although initially regarded as a special form of IGE, this
unusual syndrome is probably a form of inherited focal
epilepsy.

Further to these studies, mutations in other genes
10 have been identified to be causative of epilepsy. These
include mutations in the beta-2 subunit (CHRNB2) of the
neuronal nicotinic acetylcholine receptor (PCT/AU01/00541;
Phillips et al., 2001) and the delta subunit (GABRD) of
the GABA$_A$ receptor (PCT/AU01/00729).

15   A number of mouse models approximating human IGE are
known. These mice mutants have ataxia in addition to
generalized spike-and-wave discharges with absences or
tonic-clonic seizures. Recessive mutations in calcium
channel subunit genes have been found in lethargic
20 (CACNB4), tottering/leaner (CACNA1A), and stargazer
(CACNG2) mutants. The slow-wave epilepsy mouse mutant has
a mutation in the sodium/hydrogen exchanger gene, which
may have important downstream effects on pH-sensitive ion
channels.

25   The human and mouse literature is now suggesting that
the idiopathic epilepsies comprise a family of
channelopathies with mutations in ion channel subunits of
voltage-gated (eg SCN1A, SCN1B, KCNQ2, KCNQ3) or ligand-
gated (eg CHRNA4, CHRNB2, GABRG2, GABRD) types. These
30 channels are typically comprised of a number of subunits,
specified by genes on different chromosomes. The
stoichiometry and conformation of ion channel subunits are
not yet well understood, but many have multiple subunits
in a variety of combinations.

35   The involvement of ion channels in other
neuro/physiological disorders has also been observed
(reviewed in Dworakowska and Dolowy, 2000). Mutations in

voltage-gated sodium, potassium, calcium and chloride channels as well as ligand-gated channels such as the acetylcholine and GABA receptors may lead to physiological disorders such as hyper- and hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia and cardiac arrhythmias. Neurological disorders other than epilepsy that are associated with ion channel mutations include episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, as well as neuropathic pain, inflammatory pain and chronic/acute pain. Some kidney disorders such as Bartter's syndrome, polycystic kidney disease and Dent's disease, secretion disorders such as hyperinsulinemic hypoglycemia of infancy and cystic fibrosis, and vision disorders such as congenital stationary night blindness and total colour-blindness may also be linked to mutations in ion channels.

Disclosure of the Invention

In a new genetic model for the idiopathic generalised epilepsies (IGEs) described in PCT/AU01/00872 (the disclosure of which is incorporated herein by reference) it has been postulated that most classical IGE and GEFS$^+$ cases are due to the combination of two mutations in multi-subunit ion channels. These are typically point mutations resulting in a subtle change of function. The critical postulate is that two mutations, usually, but not exclusively, in different subunit alleles ("digenic model"), are required for clinical expression of IGE. It was further proposed that

a)   A number of different mutated subunit pairs can be responsible for IGE. Combinations of two mutated subunits lead to an IGE genotype with ~30% penetrance.

b)   The total allele frequency of mutated subunits is ~8%. It was calculated that approximately 15% of the population has one or more mutated

subunit genes and 1% have two or more mutated
subunits.

c)   Sub-syndromes are principally determined by the
      specific combination of mutated subunit pairs,
      although one or more other genes, including ion
      channel subunits, of smaller effect may modify
      the phenotype.

d)   Mutated subunit combinations that cause
      classical IGEs are largely separate from those
      that cause GEFS$^+$, although some subunits may be
      involved in both syndromes.

e)   Individuals with single 'change of function'
      mutations would not have IGE, but such mutations
      may contribute to simple febrile seizures, which
      are observed with increased frequency in
      relatives of IGE probands.

The model also proposes that subunit mutations with
more severe functional consequences (eg breaking a
disulphide bridge in SCN1B or amino acid substitution in
the pore forming regions of SCN1A for GEFS$^+$) cause
autosomal dominant generalized epilepsies with a
penetrance of 60-90%. The precise sub-syndromes in GEFS$^+$
are determined by minor allelic variation or mutations in
other ion channel subunits. Such "severe" mutations are
rare (allele frequency <0.01%) and are infrequent causes
of GEFS$^+$. They very rarely, or perhaps never, cause
classical IGE.

The identification of molecular changes in ion
channel subunits is therefore a significant step towards
the elucidation of genetic variants that alone or in
combination (based on the digenic model) give rise to an
epilepsy phenotype, and to other neuro/physiological
disorders associated with ion channel dysfunction.

The present inventors have identified a number of
novel mutations or variants in genes encoding subunits of
ion channels in individuals with epilepsy. It will be
appreciated that for each molecular defect one can provide

an isolated nucleic acid molecule coding for a protein
having a biological function as part of an ion channel in
a mammal, wherein a mutation event selected from the group
consisting of point mutations, deletions, insertions and
5   rearrangements has occurred so as to affect the
functioning of the ion channel. In some instances this
single mutation alone will produce a phenotype of epilepsy
or other neuro/physiological disorders associated with ion
channel dysfunction.

10   In the case where a single mutation alone does not
produce, say, an epilepsy phenotype, there would be
provided one or more additional isolated nucleic acid
molecules coding for proteins having a biological function
as part of an ion channel in a mammal, wherein a mutation
15   event selected from the group consisting of point
mutations, deletions, insertions and rearrangements has
occurred so as to affect the functioning of the ion
channel. The cumulative effect of the mutations in each
isolated nucleic acid molecule *in vivo* is to produce a
20   epilepsy or another neuro/physiological disorders in said
mammal. The mutations may be in nucleic acid molecules
coding for protein subunits belonging to the same ion
channel or may be in nucleic acid molecules coding for
protein subunits that belong to different ion channels.

25   Typically such mutations are point mutations and the
ion channels are voltage-gated channels such as a sodium,
potassium, calcium or chloride channels or are ligand-
gated channels such as members of the nAChR/GABA super
family of receptors, or a functional fragment or homologue
30   thereof.

Mutations may include those in non-coding regions of
the ion channel subunits (eg mutations in the promoter
region which affect the level of expression of the subunit
gene, mutations in intronic sequences which affect the
35   correct splicing of the subunit during mRNA processing, or
mutations in the 5' or 3' untranslated regions that can
affect translation or stability of the mRNA). Mutations

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may also and more preferably will be in coding regions of
the ion channel subunits (eg nucleotide mutations may give
rise to an amino acid change in the encoded protein or
nucleotide mutations that do not give rise to an amino
5   acid change but may affect the stability of the mRNA).

Mutation combinations may be selected from, but are
not restricted to, those identified in Table 1.

Accordingly in one aspect of the present invention
there is provided a method of identifying a subject
10   predisposed to a disorder associated with ion channel
dysfunction, comprising ascertaining whether at least one
of the genes encoding ion channel subunits in said subject
has undergone a mutation event selected from the group
consisting of the mutation events set forth in the
15   following Table:

Subunit Gene	Exon/Intron	DNA Mutation
SCN1A	Exon 5	c664C→T
SCN1A	Exon 8	c1152G→A
SCN1A	Exon 9	c1183G→C
SCN1A	Exon 9	c1207T→C
SCN1A	Exon 9	c1237T→A
SCN1A	Exon 9	c1265T→A
SCN1A	Exon 21	c4219C→T
SCN1A	Exon 26	c5339T→C
SCN1A	Exon 26	c5674C→T
SCN1B	Exon 3	c254G→A
SCN2A	Exon 6A	c668G→A
SCN2A	Exon 16	c2674G→A
SCN2A	Exon 17	c3007C→A
SCN2A	Exon 19	c3598A→G
SCN2A	Exon 20	c3956G→A
SCN2A	Exon 12	c1785T→C
SCN2A	Exon 27	c4919T→A
SCN1A	Intron 9	IVS9-1G→A
SCN1A	Intron 23	IVS23+33G→A
SCN2A	Intron 7	IVS7+61T→A
SCN2A	Intron 19	IVS19-55A→G
SCN2A	Intron 22	IVS22-31A→G
SCN2A	Intron 2	IVS2-28G→A
SCN2A	Intron 8	IVS8-3T→C
SCN2A	Intron 11	IVS11+49A→G
SCN2A	Intron 11	IVS11-16C→T

SCN2A	Intron 17	IVS17-71C→T
SCN2A	Intron 17	IVS17-74delG
SCN2A	Intron 17	IVS17-74insG
CHRNA5	Exon 4	c400G→A
CHRNA2	Exon 4	c373G→A
CHRNA3	Exon 2	c110G→A
CHRNA2	Exon 4	c351C→T
CHRNA2	Exon 5	c771C→T
CHRNA3	Exon 2	c159A→G
CHRNA3	Exon 4	c291G→A
CHRNA3	Exon 4	c345G→A
CHRNA2	Intron 3	IVS3-16C→T
CHRNA3	Intron 3	IVS3-5T→C
CHRNA3	Intron 4	IVS4+8G→C
KCNQ2	Exon 1	c204-c205insC
KCNQ2	Exon 1	c1A→G
KCNQ2	Exon 1	c2T→C
KCNQ2	Exon 8	c1057C→G
KCNQ2	Exon 11	c1288C→T
KCNQ2	Exon 14	c1710A→T
KCNQ2	Exon 15	c1856T→G
KCNQ2	Intron 9	IVS9+(46-48)delCCT
KCNQ3	Intron 11	IVS11+43G→A
KCNQ3	Intron 12	IVS12+29G→A
GABRB1	Exon 5	c508C→T
GABRB1	Exon 9	c1329G→A
GABRB1	Exon 8	c975C→T
GABRG3	Exon 8	c995T→C
GABRA1	5' UTR	c-142A→G
GABRA1	5' UTR	c-31C→T
GABRA2	3' UTR	c1615G→A
GABRA5	5' UTR	c-271G→C
GABRA5	5' UTR	c-228A→G
GABRA5	5' UTR	c-149G→C
GABRB2	5' UTR	c-159C→T
GABRB2	3' UTR	c1749C→T
GABRPi	5' UTR	c-101C→T
GABRB1	Intron 1	IVS1+24T→G
GABRB1	Intron 6	IVS6+72T→G
GABRB1	Intron 7	IVS7-34A→G
GABRB3	Intron 1	IVS1-14C→T
GABRB3	Intron 7	IVS7+58delAA
GABRD	Intron 6	IVS6+132insC
GABRD	Intron 6	IVS6+130insC
GABRD	Intron 6	IVS6+73delCGCGCCCACCGCCCCTTCCGCG
GABRG3	Intron 8	IVS8-102C→T

In a further aspect there is provided a method of identifying a subject predisposed to a disorder associated with ion channel dysfunction, comprising ascertaining whether at least one of the genes encoding ion channel subunits in said subject has undergone a mutation event as set forth in one of SEQ ID Numbers: 1-72.

In another aspect of the present invention there is provided an isolated nucleic acid molecule encoding a mutant or variant ion channel subunit wherein a mutation event selected from the group consisting of the mutation events set forth in the following Table:

Subunit Gene	Exon/Intron	DNA Mutation
SCN1A	Exon 5	c664C→T
SCN1A	Exon 8	c1152G→A
SCN1A	Exon 9	c1183G→C
SCN1A	Exon 9	c1207T→C
SCN1A	Exon 9	c1237T→A
SCN1A	Exon 9	c1265T→A
SCN1A	Exon 21	c4219C→T
SCN1A	Exon 26	c5339T→C
SCN1A	Exon 26	c5674C→T
SCN1B	Exon 3	c254G→A
SCN2A	Exon 6A	c668G→A
SCN2A	Exon 16	c2674G→A
SCN2A	Exon 17	c3007C→A
SCN2A	Exon 19	c3598A→G
SCN2A	Exon 20	c3956G→A
SCN2A	Exon 12	c1785T→C
SCN2A	Exon 27	c4919T→A
SCN1A	Intron 9	IVS9-1G→A
SCN1A	Intron 23	IVS23+33G→A
SCN2A	Intron 7	IVS7+61T→A
SCN2A	Intron 19	IVS19-55A→G
SCN2A	Intron 22	IVS22-31A→G
SCN2A	Intron 2	IVS2-28G→A
SCN2A	Intron 8	IVS8-3T→C
SCN2A	Intron 11	IVS11+49A→G
SCN2A	Intron 11	IVS11-16C→T
SCN2A	Intron 17	IVS17-71C→T
SCN2A	Intron 17	IVS17-74delG
SCN2A	Intron 17	IVS17-74insG
CHRNA5	Exon 4	c400G→A
CHRNA2	Exon 4	c373G→A

CHRNA3	Exon 2	c110G→A
CHRNA2	Exon 4	c351C→T
CHRNA2	Exon 5	c771C→T
CHRNA3	Exon 2	c159A→G
CHRNA3	Exon 4	c291G→A
CHRNA3	Exon 4	c345G→A
CHRNA2	Intron 3	IVS3-16C→T
CHRNA3	Intron 3	IVS3-5T→C
CHRNA3	Intron 4	IVS4+8G→C
KCNQ2	Exon 1	c204-c205insC
KCNQ2	Exon 1	c1A→G
KCNQ2	Exon 1	c2T→C
KCNQ2	Exon 8	c1057C→G
KCNQ2	Exon 11	c1288C→T
KCNQ2	Exon 14	c1710A→T
KCNQ2	Exon 15	c1856T→G
KCNQ2	Intron 9	IVS9+(46-48)delCCT
KCNQ3	Intron 11	IVS11+43G→A
KCNQ3	Intron 12	IVS12+29G→A
GABRB1	Exon 5	c508C→T
GABRB1	Exon 9	c1329G→A
GABRB1	Exon 8	c975C→T
GABRG3	Exon 8	c995T→C
GABRA1	5' UTR	c-142A→G
GABRA1	5' UTR	c-31C→T
GABRA2	3' UTR	c1615G→A
GABRA5	5' UTR	c-271G→C
GABRA5	5' UTR	c-228A→G
GABRA5	5' UTR	c-149G→C
GABRB2	5' UTR	c-159C→T
GABRB2	3' UTR	c1749C→T
GABRP1	5' UTR	c-101C→T
GABRB1	Intron 1	IVS1+24T→G
GABRB1	Intron 6	IVS6+72T→G
GABRB1	Intron 7	IVS7-34A→G
GABRB3	Intron 1	IVS1-14C→T
GABRB3	Intron 7	IVS7+58delAA
GABRD	Intron 6	IVS6+132insC
GABRD	Intron 6	IVS6+130insC
GABRD	Intron 6	IVS6+73delCGCGCCCACCGCCCCTTCCGCG
GABRG3	Intron 8	IVS8-102C→T

has occurred.

In still another aspect of the present invention there is provided an isolated nucleic acid molecule encoding a mutant or variant ion channel subunit wherein a

mutation event has occurred as set forth in one of SEQ ID Numbers: 1-72.

The mutation event disrupts the functioning of an ion channel so as to produce a phenotype of epilepsy, and/or one or more other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness, either alone or in combination with one or more additional mutations or variations in the ion channel subunit genes.

In another aspect of the present invention there is provided an isolated nucleic acid molecule encoding a mutant KCNQ2 subunit, wherein the mutation event has occurred in the C-terminal domain of the KCNQ2 subunit and leads to a disturbance in the calmodulin binding affinity of the subunit, so as to produce an epilepsy phenotype.

In one form of the invention, the mutations are in exon 8 or exon 15 of the KCNQ2 subunit and result in the replacement of an arginine residue with a glycine residue at amino acid position 353, or the replacement of a leucine residue with an arginine at amino acid position 619. The R353G mutation occurs as a result of a C to G nucleotide substitution at position 1057 of the KCNQ2 coding sequence as shown in SEQ ID NO: 44. The L619R mutation occurs as a result of a T to G nucleotide substitution at position 1856 of the KCNQ2 coding sequence as shown in SEQ ID NO: 47.

In a further form of the invention, the mutations are in exon 11 or exon 14 of the KCNQ2 subunit and result in

the replacement of an arginine residue with a stop codon at amino acid position 430, or the replacement of an arginine residue with a serine at amino acid position 570. The R430X mutation occurs as a result of a C to T

5   nucleotide substitution at position 1288 of the KCNQ2 coding sequence as shown in SEQ ID NO: 45. The R570S mutation occurs as a result of an A to T nucleotide substitution at position 1710 of the KCNQ2 coding sequence as shown in SEQ ID NO: 46.

10   Preferably these mutations create a phenotype of benign familial neonatal seizures (BFNS).

         In a further aspect of the present invention there is provided a combination of two or more isolated nucleic acid molecules each having a novel mutation event as laid

15   out in Table 1. The cumulative effect of the mutations in each isolated nucleic acid molecule *in vivo* is to produce an epilepsy or another disorder associated with ion channel dysfunction as described above in said mammal.

         In a particularly preferred embodiment of the present

20   invention, the isolated nucleic acid molecules have a nucleotide sequence as shown in any one of SEQ ID Numbers: 1-72. The sequences correspond to the novel DNA mutations or variants laid out in Table 1.

         In another aspect of the present invention there is

25   provided an isolated nucleic acid molecule comprising any one of the nucleotide sequences set forth in SEQ ID Numbers: 1-72.

         In another aspect of the present invention there is provided an isolated nucleic acid molecule consisting of

30   any one of the nucleotide sequences set forth in SEQ ID Numbers: 1-72.

         The nucleotide sequences of the present invention can be engineered using methods accepted in the art for a variety of purposes. These include, but are not limited

35   to, modification of the cloning, processing, and/or expression of the gene product. PCR reassembly of gene fragments and the use of synthetic oligonucleotides allow

the engineering of the nucleotide sequences of the present
invention. For   example,   oligonucleotide-mediated   site-
directed mutagenesis can introduce further mutations that
create new restriction sites, alter expression patterns
5   and produce splice variants etc.

As a result of the degeneracy of the genetic code, a
number of polynucleotide sequences, some that may have
minimal similarity to the polynucleotide sequences of any
known and naturally occurring gene, may be produced. Thus,
10   the invention includes each and every possible variation
of a polynucleotide sequence that could be made by
selecting combinations based on possible codon choices.
These combinations are made in accordance with the
standard   triplet   genetic   code   as   applied   to   the
15   polynucleotide sequences of the present invention, and all
such variations are to be considered as being specifically
disclosed.

The nucleic acid molecules of this invention are
typically DNA molecules, and include cDNA, genomic DNA,
20   synthetic   forms,   and mixed   polymers,   both   sense   and
antisense strands, and may be chemically or biochemically
modified,   or   may   contain   non-natural   or   derivatised
nucleotide bases as will be appreciated by those skilled
in   the   art.   Such   modifications   include   labels,
25   methylation,   intercalators,   alkylators   and   modified
linkages. In some instances it may be advantageous to
produce nucleotide sequences possessing a substantially
different codon usage than that of the polynucleotide
sequences of the present invention. For example, codons
30   may be selected to increase the rate of expression of the
peptide in a particular prokaryotic or eukaryotic host
corresponding with the frequency that particular codons
are utilized by the host. Other reasons to alter the
nucleotide sequence without altering the encoded amino
35   acid sequences include the production of RNA transcripts
having more desirable properties, such as a greater half-

life, than transcripts produced from the naturally occurring mutated sequence.

The invention also encompasses production of nucleic acid sequences of the present invention entirely by synthetic chemistry. Synthetic sequences may be inserted into expression vectors and cell systems that contain the necessary elements for transcriptional and translational control of the inserted coding sequence in a suitable host. These elements may include regulatory sequences, promoters, 5' and 3' untranslated regions and specific initiation signals (such as an ATG initiation codon and Kozak consensus sequence) which allow more efficient translation of sequences encoding the polypeptides of the present invention. In cases where the complete coding sequence, including the initiation codon and upstream regulatory sequences, are inserted into the appropriate expression vector, additional control signals may not be needed. However, in cases where only coding sequence, or a fragment thereof, is inserted, exogenous translational control signals as described above should be provided by the vector. Such signals may be of various origins, both natural and synthetic. The efficiency of expression may be enhanced by the inclusion of enhancers appropriate for the particular host cell system used (Scharf et al., 1994).

The invention also includes nucleic acid molecules that are the complements of the sequences described herein.

The present invention allows for the preparation of purified polypeptide or protein from the polynucleotides of the present invention, or variants thereof. In order to do this, host cells may be transformed with a novel nucleic acid molecule as described above, or with nucleic acid molecules encoding two or more mutant ion channel subunits. If the mutant subunits form a part of the same ion channel a receptor protein containing two or more mutant subunits may be isolated. If the mutant subunits are subunits of different ion channels the host cells will

express two or more mutant receptor proteins. Typically said host cells are transfected with an expression vector comprising a DNA molecule according to the invention or, in particular, DNA molecules encoding two or more mutant
5   ion channel subunits. A variety of expression vector/host systems may be utilized to contain and express sequences encoding polypeptides of the invention. These include, but are not limited to, microorganisms such as bacteria transformed with plasmid or cosmid DNA expression vectors;
10   yeast transformed with yeast expression vectors; insect cell systems infected with viral expression vectors (e.g., baculovirus); or mouse or other animal or human tissue cell systems. Mammalian cells can also be used to express a protein using a vaccinia virus expression system. The
15   invention is not limited by the host cell or vector employed.

The polynucleotide sequences, or variants thereof, of the present invention can be stably expressed in cell lines to allow long term production of recombinant
20   proteins in mammalian systems. Sequences encoding the polypeptides of the present invention can be transformed into cell lines using expression vectors which may contain viral origins of replication and/or endogenous expression elements and a selectable marker gene on the same or on a
25   separate vector. The selectable marker confers resistance to a selective agent, and its presence allows growth and recovery of cells which successfully express the introduced sequences. Resistant clones of stably transformed cells may be propagated using tissue culture
30   techniques appropriate to the cell type.

The protein produced by a transformed cell may be secreted or retained intracellularly depending on the sequence and/or the vector used. As will be understood by those of skill in the art, expression vectors containing
35   polynucleotides which encode a protein may be designed to contain signal sequences which direct secretion of the protein through a prokaryotic or eukaryotic cell membrane.

In addition, a host cell strain may be chosen for its ability to modulate expression of the inserted sequences or to process the expressed protein in the desired fashion. Such modifications of the polypeptide include,
5   but are not limited to, acetylation, glycosylation, phosphorylation, and acylation. Post-translational cleavage of a "prepro" form of the protein may also be used to specify protein targeting, folding, and/or activity. Different host cells having specific cellular
10 machinery and characteristic mechanisms for post-translational activities (e.g., CHO or HeLa cells), are available from the American Type Culture Collection (ATCC) and may be chosen to ensure the correct modification and processing of the foreign protein.

15   When large quantities of the protein product of the gene are needed, such as for antibody production, vectors which direct high levels of expression of this protein may be used, such as those containing the T5 or T7 inducible bacteriophage promoter. The present invention also
20 includes the use of the expression systems described above in generating and isolating fusion proteins which contain important functional domains of the protein. These fusion proteins are used for binding, structural and functional studies as well as for the generation of appropriate
25 antibodies.

        In order to express and purify the protein as a fusion protein, the appropriate cDNA sequence is inserted into a vector which contains a nucleotide sequence encoding another peptide (for example, glutathionine
30 succinyl transferase). The fusion protein is expressed and recovered from prokaryotic or eukaryotic cells. The fusion protein can then be purified by affinity chromatography based upon the fusion vector sequence. The desired protein is then obtained by enzymatic cleavage of the fusion
35 protein.

        Fragments of the polypeptides of the present invention may also be produced by direct peptide synthesis

using solid-phase techniques. Automated synthesis may be achieved by using the ABI 431A Peptide Synthesizer (Perkin-Elmer). Various fragments of this protein may be synthesized separately and then combined to produce the full-length molecule.

The present invention is also concerned with polypeptides having a biological function as an ion channel in a mammal, wherein a mutation event selected from the group consisting of substitutions, deletions, truncations, insertions and rearrangements has occurred so as to affect the functioning of the ion channel. In some instances this single mutation alone will produce an epilepsy phenotype or other neuro/physiological disorders associated with ion channel dysfunction.

In the case where a single mutation alone does not produce, say, an epilepsy phenotype, there would be provided one or more additional isolated mammalian polypeptides having biological functions as part of an ion channel in a mammal, wherein a mutation event selected from the group consisting of substitutions, deletions, truncations, insertions and rearrangements has occurred so as to affect the functioning of the ion channel. The cumulative effect of the mutations in each isolated mammalian polypeptide *in vivo* being to produce epilepsy or another neuro/physiological disorder in said mammal. The mutations may be in polypeptide subunits belonging to the same ion channel as described above, but may also be in polypeptide subunits that belong to different ion channels.

Typically the mutation is an amino acid substitution and the ion channel is a voltage-gated channel such as a sodium, potassium, calcium or chloride channel or a ligand-gated channel such as a member of the nAChR/GABA super family of receptors, or a functional fragment or homologue thereof.

Mutation combinations may be selected from, but are not restricted to, those represented in Table 1.

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Accordingly, in a further aspect of the present invention there is provided an isolated polypeptide, said polypeptide being a mutant or variant ion channel subunit wherein a mutation event selected from the group
5   consisting of the mutation events set forth in the following Table:

Subunit Gene	Amino Acid Change
SCN1A	R222X
SCN1A	W384X
SCN1A	A395P
SCN1A	F403L
SCN1A	Y413N
SCN1A	V422E
SCN1A	R1407X
SCN1A	M1780T
SCN1A	R1892X
SCN1B	R85H
SCN2A	R223Q
SCN2A	V892I
SCN2A	L1003I
SCN2A	T1200A
SCN2A	R1319Q
CHRNA5	V134I
CHRNA2	A125T
CHRNA3	R37H
KCNQ2	K69fsX119
KCNQ2	M1V
KCNQ2	M1T
KCNQ2	R353G
KCNQ2	R430X
KCNQ2	R570S
KCNQ2	L619R

has occurred.

In a further aspect of the invention there is provided an isolated polypeptide, said polypeptide being a
10   mutant or variant ion channel subunit wherein a mutation event has occurred such that the polypeptide has the amino acid sequence set forth in one of SEQ ID Numbers: 73-95. The mutation event disrupts the functioning of an ion channel so as to produce a phenotype of epilepsy, and/or
15   one or more other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic

ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome,
5   polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness.

        In a particularly preferred embodiment of the present
10 invention, the isolated polypeptide has an amino acid sequence as shown in any one of SEQ ID Numbers: 73-95. The sequences correspond to the novel amino acid changes laid out in Table 1 for those instances where the DNA mutation results in an amino acid change.

15   According to still another aspect of the present invention there is provided an isolated polypeptide, said polypeptide being a mutant KCNQ2 subunit, wherein the mutation event has occurred in the C-terminal domain of the KCNQ2 subunit and leads to a disturbance in the
20 calmodulin binding affinity of the subunit, so as to produce an epilepsy phenotype.

        In one form of the invention the mutations are substitutions in which an arginine residue is replaced with a glycine residue, or a leucine residue is replaced
25 with an arginine. Preferably the substitutions are R353G and L619R transitions as illustrated by SEQ ID NOS: 92 and 95 respectively.

        In a further form of the invention the mutations result in the replacement of an arginine for a stop codon,
30 or an arginine is replaced with a serine. Preferably the mutations are R430X and R570S transitions as illustrated by SEQ ID NOS: 93 and 94 respectively.

        In a still further aspect of the present invention there is provided a combination of two or more isolated
35 polypeptides each having a novel mutation event as laid out in Table 1. The cumulative effect of the mutations in each isolated polypeptide molecule *in vivo* is to produce

an epilepsy or another disorder associated with ion channel dysfunction as described above in said mammal.

In a particularly preferred embodiment of the present invention, the isolated polypeptides have an amino acid
5 sequence as shown in any one of SEQ ID Numbers: 73-95. The sequences correspond to the novel amino acid changes laid out in Table 1.

According to still another aspect of the present invention there is provided an isolated polypeptide
10 comprising the amino acid sequence set forth in any one of SEQ ID Numbers: 73-95.

According to still another aspect of the present invention there is provided a polypeptide consisting of the amino acid sequence set forth in any one of SEQ ID
15 Numbers: 73-95.

According to still another aspect of the present invention there is provided a method of preparing a polypeptide, comprising the steps of:

(1) culturing host cells transfected with an
20   expression vector comprising a nucleic acid molecule as described above under conditions effective for polypeptide production; and

(2) harvesting the mutant ion channel subunit.

The mutant ion channel subunit may be allowed to
25 assemble with other subunits constituting the channel that are either wild-type or themselves mutant subunits, whereby the assembled ion channel is harvested.

According to still another aspect of the invention there is provided a polypeptide which is the product of
30 the process described above.

Substantially purified protein or fragments thereof can then be used in further biochemical analyses to establish secondary and tertiary structure. Such methodology is known in the art and includes, but is not
35 restricted to, X-ray crystallography of crystals of the proteins or of the assembled ion channel incorporating the proteins or by nuclear magnetic resonance (NMR).

Determination of structure allows for the rational design of pharmaceuticals to interact with the ion channel as a whole or through interaction with a specific subunit protein (see drug screening below), alter the overall ion
5   channel protein charge configuration or charge interaction with other proteins, or to alter its function in the cell.

It will be appreciated that the mutant ion channel subunits included as part of the present invention will be useful in further applications which include a variety of
10 hybridisation and immunological assays to screen for and detect the presence of either a normal or mutated gene or gene product. The invention enables therapeutic methods for the treatment of epilepsy as well as other disorders associated with ion channel dysfunction and also enables
15 methods for the diagnosis or prognosis of epilepsy as well as other disorders associated with ion channel dysfunction.

Therapeutic Applications

20   According to still another aspect of the invention there is provided a method of treating epilepsy as well as other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia,
25 myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney
30 disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, comprising administering a selective antagonist, agonist or modulator of an ion channel or ion channel subunit, when the ion
35 channel contains a mutation in a subunit comprising the channel, as described above, to a subject in need of such treatment. Said mutation event may be causative of the

disorder when expressed alone or when expressed in combination with one or more additional mutations in subunits of the same or different ion channels, which are typically those identified in Table 1.

In still another aspect of the invention there is provided the use of a selective antagonist, agonist or modulator of an ion channel or ion channel subunit when the ion channel contains a mutation in a subunit comprising the channel, as described above, said mutation being causative of epilepsy as well as other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, when expressed alone or when expressed in combination with a second mutation in a subunit of the same or different ion channel, as described above, in the manufacture of a medicament for the treatment of the disorder.

In one aspect, a suitable antagonist, agonist or modulator will restore wild-type function to the ion channel or channels containing the mutations of the present invention, or will negate the effects the mutant channel or channels have on cell function.

Using methods well known in the art, a mutant ion channel may be used to produce antibodies specific for the mutant channel that is causative of the disease or to screen libraries of pharmaceutical agents to identify those that bind the mutant ion channel.

In one aspect, an antibody, which specifically binds to a mutant ion channel or mutant ion channel subunit of

the invention, may be used directly as an agonist, antagonist or modulator, or indirectly as a targeting or delivery mechanism for bringing a pharmaceutical agent to cells or tissues that express the mutant ion channel.

In a still further aspect of the invention there is provided an antibody which is immunologically reactive with a polypeptide as described above, but not with a wild-type ion channel or ion channel subunit thereof.

In particular, there is provided an antibody to an assembled ion channel containing a mutation in a subunit comprising the channel, which is causative of epilepsy or another disorder associated with ion channel dysfunction when expressed alone or when expressed in combination with one or more other mutations in subunits of the same or different ion channels. Such antibodies may include, but are not limited to, polyclonal, monoclonal, chimeric, and single chain antibodies as would be understood by the person skilled in the art.

For the production of antibodies, various hosts including rabbits, rats, goats, mice, humans, and others may be immunized by injection with a polypeptide as described above or with any fragment or oligopeptide thereof which has immunogenic properties. Various adjuvants may be used to increase immunological response and include, but are not limited to, Freund's, mineral gels such as aluminium hydroxide, and surface-active substances such as lysolecithin. Adjuvants used in humans include BCG (bacilli Calmette-Guerin) and Corynebacterium parvum.

It is preferred that the oligopeptides, peptides, or fragments used to induce antibodies to the mutant ion channel have an amino acid sequence consisting of at least 5 amino acids, and, more preferably, of at least 10 amino acids. It is also preferable that these oligopeptides, peptides, or fragments are identical to a portion of the amino acid sequence of the natural protein and contain the entire amino acid sequence of a small, naturally occurring

molecule. Short stretches of ion channel amino acids may be fused with those of another protein, such as KLH, and antibodies to the chimeric molecule may be produced.

Monoclonal antibodies to a mutant ion channel may be prepared using any technique which provides for the production of antibody molecules by continuous cell lines in culture. These include, but are not limited to, the hybridoma technique, the human B-cell hybridoma technique, and the EBV-hybridoma technique. (For example, see Kohler et al., 1975; Kozbor et al., 1985; Cote et al., 1983; Cole et al., 1984).

Monoclonal antibodies produced may include, but are not limited to, mouse-derived antibodies, humanised antibodies and fully human antibodies.

Antibodies may also be produced by inducing *in vivo* production in the lymphocyte population or by screening immunoglobulin libraries or panels of highly specific binding reagents as disclosed in the literature. (For example, see Orlandi et al., 1989; Winter and Milstein, 1991).

Antibody fragments which contain specific binding sites for a mutant ion channel may also be generated. For example, such fragments include, F(ab')2 fragments produced by pepsin digestion of the antibody molecule and Fab fragments generated by reducing the disulfide bridges of the F(ab')2 fragments. Alternatively, Fab expression libraries may be constructed to allow rapid and easy identification of monoclonal Fab fragments with the desired specificity. (For example, see Huse et al., 1989).

Various immunoassays may be used for screening to identify antibodies having the desired specificity. Numerous protocols for competitive binding or immunoradiometric assays using either polyclonal or monoclonal antibodies with established specificities are well known in the art. Such immunoassays typically involve the measurement of complex formation between an ion channel and its specific antibody. A two-site, monoclonal-

based immunoassay utilizing antibodies reactive to two non-interfering ion channel epitopes is preferred, but a competitive binding assay may also be employed.

In a further aspect of the invention there is provided a method of treating epilepsy as well as other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, comprising administering an isolated nucleic acid molecule which is the complement (antisense) of any one of the nucleic acid molecules described above and which encodes an RNA molecule that hybridizes with the mRNA encoding a mutant ion channel subunit of the invention, to a subject in need of such treatment.

In a still further aspect of the invention there is provided the use of an isolated nucleic acid molecule which is the complement (antisense) of a nucleic acid molecule of the invention and which encodes an RNA molecule that hybridizes with the mRNA encoding a mutant ion channel subunit of the invention, in the manufacture of a medicament for the treatment of epilepsy as well as other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney

disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.

Typically, a vector expressing the complement
5   (antisense) of the polynucleotides of the invention may be administered to a subject in need of such treatment. Many methods for introducing vectors into cells or tissues are available and equally suitable for use *in vivo*, *in vitro*, and *ex vivo*. For *ex vivo* therapy, vectors may be
10 introduced into stem cells taken from the patient and clonally propagated for autologous transplant back into that same patient. Delivery by transfection, by liposome injections, or by polycationic amino polymers may be achieved using methods which are well known in the art.
15 (For example, see Goldman *et al.*, 1997).

Additional antisense or gene-targeted silencing strategies may include, but are not limited to, the use of antisense oligonucleotides, injection of antisense RNA, transfection of antisense RNA expression vectors, and the
20 use of RNA interference (RNAi) or short interfering RNAs (siRNA). Still further, catalytic nucleic acid molecules such as DNAzymes and ribozymes may be used for gene silencing (Breaker and Joyce, 1994; Haseloff and Gerlach, 1988). These molecules function by cleaving their target
25 mRNA molecule rather than merely binding to it as in traditional antisense approaches.

In a further aspect, a suitable agonist, antagonist or modulator may include peptides, phosphopeptides or small organic or inorganic compounds that can restore
30 wild-type activity of ion channels containing mutations in the subunits which comprise the channels as described above.

Peptides, phosphopeptides or small organic or inorganic compounds suitable for therapeutic applications
35 may be identified using nucleic acids and peptides of the invention in drug screening applications as described below. Molecules identified from these screens may also be

of therapeutic application in affected individuals carrying other ion channel subunit gene mutations if the molecule is able to correct the common underlying functional deficit imposed by these mutations and those of
5   the invention.

There is therefore provided a method of treating epilepsy as well as other disorders associated with ion channel dysfunction comprising administering a compound that is a suitable agonist, antagonist or modulator of an
10   ion channel and that has been identified using the mutant ion channel subunits of the invention.

In some instances, an appropriate approach for treatment may be combination therapy. This may involve the administering an antibody or complement (antisense) to a
15   mutant ion channel or ion channel subunit of the invention to inhibit its functional effect, combined with administration of wild-type ion channel subunits which may restore levels of wild-type ion channel formation to normal levels. Wild-type ion channel subunits of the
20   invention can be administered using gene therapy approaches as described above for complement administration.

There is therefore provided a method of treating epilepsy as well as other disorders associated with ion
25   channel dysfunction comprising administration of an antibody or complement to a mutant ion channel or ion channel subunit of the invention in combination with administration of wild-type ion channel subunits.

In still another aspect of the invention there is
30   provided the use of an antibody or complement to a mutant ion channel or ion channel subunit of the invention in combination with the use of wild-type ion channel subunits, in the manufacture of a medicament for the treatment of epilepsy as well as other disorders
35   associated with ion channel dysfunction.

In further embodiments, any of the agonists, antagonists, modulators, antibodies, complementary

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sequences or vectors of the invention may be administered in combination with other appropriate therapeutic agents. Selection of the appropriate agents may be made by those skilled in the art, according to conventional
5   pharmaceutical principles. The combination of therapeutic agents may act synergistically to effect the treatment or prevention of the various disorders described above. Using this approach, therapeutic efficacy with lower dosages of each agent may be possible, thus reducing the potential
10   for adverse side effects.

         Any of the therapeutic methods described above may be applied to any subject in need of such therapy, including, for example, mammals such as dogs, cats, cows, horses, rabbits, monkeys, and most preferably, humans.
15

Drug Screening

         According to still another aspect of the invention, nucleic acid molecules of the invention as well as peptides of the invention, particularly purified mutant
20   ion channel subunit polypeptide and cells expressing these, are useful for the screening of candidate pharmaceutical agents for the treatment of epilepsy as well as other as other disorders associated with ion channel dysfunction, including but not restricted to,
25   hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms,
30   neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.
35   Still further, it provides the use of a polypeptide complex for the screening of candidate pharmaceutical compounds.

Still further, it provides the use wherein high throughput screening techniques are employed.

Compounds that can be screened in accordance with the invention include, but are not limited to peptides (such as soluble peptides), phosphopeptides and small organic or inorganic molecules (such as natural product or synthetic chemical libraries and peptidomimetics).

In one embodiment, a screening assay may include a cell-based assay utilising eukaryotic or prokaryotic host cells that are stably transformed with recombinant molecules expressing the polypeptides or fragments of the invention, in competitive binding assays. Binding assays will measure the formation of complexes between a specific mutant ion channel subunit polypeptide or ion channel incorporating a mutant ion channel subunit polypeptide, and the compound being tested, or will measure the degree to which a compound being tested will inhibit or restore the formation of a complex between a specific mutant ion channel subunit polypeptide or ion channel incorporating a mutant ion channel subunit polypeptide, and its interactor or ligand.

The invention is particularly useful for screening compounds by using the polypeptides of the invention in transformed cells, transfected or injected oocytes, or animal models bearing mutated ion channel subunits such as transgenic animals or gene targeted (knock-in) animals (see transformed hosts). Drug candidates can be added to cultured cells that express a single mutant ion channel subunit or combination of mutant ion channel subunits (appropriate wild-type ion channel subunits should also be expressed for receptor assembly), can be added to oocytes transfected or injected with either a mutant ion channel subunit or combination of mutant ion channel subunits (appropriate wild-type ion channel subunits must also be injected for receptor assembly), or can be administered to an animal model containing a mutant ion channel or combination of mutant ion channels. Determining the

ability of the test compound to modulate mutant ion channel activity can be accomplished by a number of techniques known in the art. These include for example measuring the effect on the current of the channel (e.g.
5   calcium-, chloride-, sodium-, potassium-ion flux) as compared to the current of a cell or animal containing wild-type ion channels. Current in cells can be measured by a number of approaches including the patch-clamp technique (methods described in Hamill *et al*, 1981) or
10 using fluorescence based assays as are known in the art (see Gonzalez et al. 1999). Drug candidates that alter the current to a more normal level are useful for treating or preventing epilepsy as well as other disorders associated with ion channel dysfunction.
15   Non cell-based assays may also be used for identifying compounds that can inhibit or restore binding between the polypeptides of the invention or ion channels incorporating the polypeptides of the invention, and their interactors. Such assays are known in the art and include
20 for example AlphaScreen technology (PerkinElmer Life Sciences, MA, USA). This application relies on the use of beads such that each interaction partner is bound to a separate bead via an antibody. Interaction of each partner will bring the beads into proximity, such that laser
25 excitation initiates a number of chemical reactions ultimately leading to fluorophores emitting a light signal. Candidate compounds that inhibit the binding of the mutant ion channel subunit, or ion channel incorporating the mutant subunit, with its interactor will
30 result in loss of light emission, while candidate compounds that restore the binding of the mutant ion channel subunit, or ion channel incorporating the mutant subunit, with its interactor will result in positive light emission. These assays ultimately enable identification
35 and isolation of the candidate compounds.
         High-throughput drug screening techniques may also employ methods as described in WO84/03564. Small peptide

test compounds synthesised on a solid substrate can be assayed for mutant ion channel subunit polypeptide or mutant ion channel binding. Bound mutant ion channel or mutant ion channel subunit polypeptide is then detected by

5   methods well known in the art. In a variation of this technique, purified polypeptides of the invention can be coated directly onto plates to identify interacting test compounds.

       The invention also contemplates the use of

10   competition drug screening assays in which neutralizing antibodies capable of specifically binding the mutant ion channel compete with a test compound for binding thereto. In this manner, the antibodies can be used to detect the presence of any peptide that shares one or more antigenic

15   determinants of the mutant ion channel.

       The polypeptides of the present invention may also be used for screening compounds developed as a result of combinatorial library technology. This provides a way to test a large number of different substances for their

20   ability to modulate activity of a polypeptide. A substance identified as a modulator of polypeptide function may be peptide or non-peptide in nature. Non-peptide "small molecules" are often preferred for many *in vivo* pharmaceutical applications. In addition, a mimic or

25   mimetic of the substance may be designed for pharmaceutical use. The design of mimetics based on a known pharmaceutically active compound ("lead" compound) is a common approach to the development of novel pharmaceuticals. This is often desirable where the

30   original active compound is difficult or expensive to synthesise or where it provides an unsuitable method of administration. In the design of a mimetic, particular parts of the original active compound that are important in determining the target property are identified. These

35   parts or residues constituting the active region of the compound are known as its pharmacophore. Once found, the pharmacophore structure is modelled according to its

physical properties using data from a range of sources
including x-ray diffraction data and NMR. A template
molecule is then selected onto which chemical groups which
mimic the pharmacophore can be added. The selection can be
5   made such that the mimetic is easy to synthesise, is
likely to be pharmacologically acceptable, does not
degrade *in vivo* and retains the biological activity of the
lead compound. Further optimisation or modification can be
carried out to select one or more final mimetics useful
10   for *in vivo* or clinical testing.

It is also possible to isolate a target-specific
antibody and then solve its crystal structure. In
principle, this approach yields a pharmacophore upon which
subsequent drug design can be based as described above. It
15   may be possible to avoid protein crystallography
altogether by generating anti-idiotypic antibodies (anti-
ids) to a functional, pharmacologically active antibody.
As a mirror image of a mirror image, the binding site of
the anti-ids would be expected to be an analogue of the
20   original receptor. The anti-id could then be used to
isolate peptides from chemically or biologically produced
peptide banks.

Another alternative method for drug screening relies
on structure-based rational drug design. Determination of
25   the three dimensional structure of the polypeptides of the
invention, or the three dimensional structure of the ion
channels which incorporate these polypeptides allows for
structure-based drug design to identify biologically
active lead compounds.

30   Three dimensional structural models can be generated
by a number of applications, some of which include
experimental models such as x-ray crystallography and NMR
and/or from *in silico* studies of structural databases such
as the Protein Databank (PDB). In addition, three
35   dimensional structural models can be determined using a
number of known protein structure prediction techniques
based on the primary sequences of the polypeptides (e.g.

SYBYL — Tripos Associated, St. Louis, MO), *de novo* protein structure design programs (e.g. MODELER — MSI Inc., San Diego, CA, or MOE — Chemical Computing Group, Montreal, Canada) or *ab initio* methods (e.g. see US Patent Numbers
5   5331573 and 5579250).

Once the three dimensional structure of a polypeptide or polypeptide complex has been determined, structure-based drug discovery techniques can be employed to design biologically-active compounds based on these three
10   dimensional structures. Such techniques are known in the art and include examples such as DOCK (University of California, San Francisco) or AUTODOCK (Scripps Research Institute, La Jolla, California). A computational docking protocol will identify the active site or sites that are
15   deemed important for protein activity based on a predicted protein model. Molecular databases, such as the Available Chemicals Directory (ACD) are then screened for molecules that complement the protein model.

Using methods such as these, potential clinical drug
20   candidates can be identified and computationally ranked in order to reduce the time and expense associated with typical 'wet lab' drug screening methodologies.

Compounds identified through screening procedures as described above, and which are based on the use of the
25   mutant nucleic acid and polypeptides of the invention, can also be tested for their effect on correcting the functional deficit imposed by other gene mutations in affected individuals including other ion channel subunit mutations.

30   Such compounds form a part of the present invention, as do pharmaceutical compositions containing these and a pharmaceutically acceptable carrier.

Pharmaceutical Preparations
35   Compounds identified from screening assays and shown to restore ion channel wild-type activity can be administered to a patient at a therapeutically effective

dose to treat or ameliorate epilepsy as well as other disorders associated with ion channel dysfunction, as described above. A therapeutically effective dose refers to that amount of the compound sufficient to result in

5   amelioration of symptoms of the disorder.

Toxicity and therapeutic efficacy of such compounds can be determined by standard pharmaceutical procedures in cell cultures or experimental animals. The data obtained from these studies can then be used in the formulation of

10   a range of dosages for use in humans.

Pharmaceutical compositions for use in accordance with the present invention can be formulated in a conventional manner using one or more physiological acceptable carriers, excipients or stabilisers which are

15   well known. Acceptable carriers, excipients or stabilizers are non-toxic at the dosages and concentrations employed, and include buffers such as phosphate, citrate, and other organic acids; antioxidants including absorbic acid; low molecular weight (less than about 10 residues)

20   polypeptides; proteins, such as serum albumin, gelatin, or immunoglobulins; binding agents including hydrophilic polymers such as polyvinylpyrrolidone; amino acids such as glycine, glutamine, asparagine, arginine or lysine; monosaccharides, disaccharides, and other carbohydrates

25   including glucose, mannose, or dextrins; chelating agents such as EDTA; sugar alcohols such as mannitol or sorbitol; salt-forming counterions such as sodium; and/or non-ionic surfactants such as Tween, Pluronics or polyethylene glycol (PEG).

30   The formulation of pharmaceutical compositions for use in accordance with the present invention will be based on the proposed route of administration. Routes of administration may include, but are not limited to, inhalation, insufflation (either through the mouth or

35   nose), oral, buccal, rectal or parental administration.

Diagnostic and Prognostic Applications

Polynucleotide sequences encoding an ion channel subunit may be used for the diagnosis or prognosis of epilepsy, as well as other as other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, and the use of the nucleic acid molecules incorporated as part of the invention in diagnosis or prognosis of these disorders, or a predisposition to these disorders, is therefore contemplated. The nucleic acid molecules incorporating the novel mutation events laid out in Table 1 may be used for this purpose.

The polynucleotides that may be used for diagnostic or prognostic purposes include oligonucleotide sequences, genomic DNA and complementary RNA and DNA molecules. The polynucleotides may be used to detect and quantitate gene expression in biological samples. Genomic DNA used for the diagnosis or prognosis may be obtained from body cells, such as those present in the blood, tissue biopsy, surgical specimen, or autopsy material. The DNA may be isolated and used directly for detection of a specific sequence or may be amplified by the polymerase chain reaction (PCR) prior to analysis. Similarly, RNA or cDNA may also be used, with or without PCR amplification. To detect a specific nucleic acid sequence, hybridisation using specific oligonucleotides, restriction enzyme digest and mapping, PCR mapping, RNAse protection, and various other methods may be employed. Oligonucleotides specific

to particular sequences can be chemically synthesized and labelled radioactively or nonradioactively and hybridised to individual samples immobilized on membranes or other solid-supports or in solution. The presence, absence or
5   excess expression of any one of the mutant ion channel genes of the invention may then be visualized using methods such as autoradiography, fluorometry, or colorimetry.

In a further diagnostic or prognostic approach, the
10   nucleotide sequences of the invention may be useful in assays that detect the presence of associated disorders, particularly those mentioned previously. The nucleotide sequences may be labelled by standard methods and added to a fluid or tissue sample from a patient under conditions
15   suitable for the formation of hybridisation complexes. After a suitable incubation period, the sample is washed and the signal is quantitated and compared with a standard value. If the amount of signal in the patient sample is significantly altered in comparison to a control sample
20   then the presence of altered levels of nucleotide sequences in the sample indicates the presence of the associated disorder. Such assays may also be used to evaluate the efficacy of a particular therapeutic treatment regimen in animal studies, in clinical trials,
25   or to monitor the treatment of an individual patient.

In order to provide a basis for the diagnosis or prognosis of epilepsy and other disorders as described above, which are associated with the ion channel subunit mutations or variants of the invention, the nucleotide
30   sequence of each gene can be compared between normal tissue and diseased tissue in order to establish whether the patient expresses a mutant gene.

In order to provide a basis for the diagnosis or prognosis of a disorder associated with abnormal
35   expression of an ion channel subunit gene of the invention, a normal or standard profile for expression is established. This may be accomplished by combining body

fluids or cell extracts taken from normal subjects, either animal or human, with a sequence, or a fragment thereof, encoding the relevant ion channel subunit gene, under conditions suitable for hybridisation or amplification.
Standard hybridisation may be quantified by comparing the values obtained from normal subjects with values from an experiment in which a known amount of a substantially purified polynucleotide is used. Another method to identify a normal or standard profile for expression of an ion channel subunit gene is through quantitative RT-PCR studies. RNA isolated from body cells of a normal individual is reverse transcribed and real-time PCR using oligonucleotides specific for the relevant gene is conducted to establish a normal level of expression of the gene. Standard values obtained in both these examples may be compared with values obtained from samples from patients who are symptomatic for a disorder. Deviation from standard values is used to establish the presence of a disorder.

Once the presence of a disorder is established and a treatment protocol is initiated, hybridisation assays or quantitative RT-PCR studies may be repeated on a regular basis to determine if the level of expression in the patient begins to approximate that which is observed in the normal subject. The results obtained from successive assays may be used to show the efficacy of treatment over a period ranging from several days to months.

According to a further aspect of the invention there is provided the use of a polypeptide as described above in the diagnosis or prognosis of epilepsy as well as other disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain,

chronic/acute pain, Bartter's syndrome, polycystic kidney
disease, Dent's disease, hyperinsulinemic hypoglycemia of
infancy, cystic fibrosis, congenital stationary night
blindness or total colour-blindness.

5   When a diagnostic or prognostic assay is to be based
upon proteins constituting an ion channel, a variety of
approaches are possible. For example, diagnosis or
prognosis can be achieved by monitoring differences in the
electrophoretic mobility of normal and mutant proteins
10   that form the ion channel. Such an approach will be
particularly useful in identifying mutants in which charge
substitutions are present, or in which insertions,
deletions or substitutions have resulted in a significant
change in the electrophoretic migration of the resultant
15   protein. Alternatively, diagnosis or prognosis may be
based upon differences in the proteolytic cleavage
patterns of normal and mutant proteins, differences in
molar ratios of the various amino acid residues, or by
functional assays demonstrating altered function of the
20   gene products.

In another aspect, antibodies that specifically bind
mutant ion channels may be used for the diagnosis or
prognosis of a disorder, or in assays to monitor patients
being treated with a complete ion channel or agonists,
25   antagonists, modulators or inhibitors of an ion channel.
Antibodies useful for diagnostic or prognostic purposes
may be prepared in the same manner as described above for
therapeutics. Diagnostic or prognostic assays for ion
channels include methods that utilize the antibody and a
30   label to detect a mutant ion channel in human body fluids
or in extracts of cells or tissues. The antibodies may be
used with or without modification, and may be labelled by
covalent or non-covalent attachment of a reporter
molecule.

35   A variety of protocols for measuring the presence of
mutant ion channels, including but not restricted to,
ELISAs, RIAs, and FACS, are known in the art and provide a

basis for diagnosing or prognosing a disorder. The expression of a mutant ion channel or combination of mutant ion channels is established by combining body fluids or cell extracts taken from test mammalian subjects, preferably human, with antibody to the ion channel or channels under conditions suitable for complex formation. The amount of complex formation may be quantitated by various methods, preferably by photometric means. Antibodies specific for the mutant ion channels will only bind to individuals expressing the said mutant ion channels and not to individuals expressing only wild-type channels (ie normal individuals). This establishes the basis for diagnosing the disorder.

Once an individual has been diagnosed or prognosed with a disorder, effective treatments can be initiated as described above. Treatments can be directed to amend the combination of ion channel subunit mutations or may be directed to one mutation.

Microarray

In further embodiments, complete cDNAs, oligonucleotides or longer fragments derived from any of the polynucleotide sequences described herein may be used as probes in a microarray. The microarray can be used to diagnose or prognose epilepsy, as well as other disorders associated with ion channel dysfunction, through the identification of genetic variants, mutations, and polymorphisms in the ion channel subunits that form part of the invention, to understand the genetic basis of a disorder, or can be used to develop and monitor the activities of therapeutic agents.

According to a further aspect of the present invention, tissue material obtained from genetically modified non-human animal models generated as a result of the identification of specific ion channel subunit human mutations (see below), particularly those disclosed in the present invention, can be used in microarray experiments.

These experiments can be conducted to identify the level
of expression of specific ion channel subunits, or the
level of expression of any cDNA clone from whole-tissue
libraries, in diseased tissue as opposed to normal control

5   tissue. Variations in the expression level of genes,
including ion channel subunits, between the two tissues
indicates their possible involvement in the disease
process either as a cause or consequence of the original
ion channel subunit mutation present in the animal model.

10   These experiments may be used to determine gene function,
to understand the genetic basis of a disorder, to diagnose
or prognose a disorder, and to develop and monitor the
activities of therapeutic agents. Microarrays may be
prepared, used, and analyzed using methods known in the

15   art. (For example, see Schena et al., 1996; Heller et al.,
1997).

Transformed Hosts
       The present invention also provides for the

20   production of genetically modified (knock-out, knock-in
and transgenic), non-human animal models comprising
nucleic acid molecules containing the novel ion channel
mutations or variants as laid out in Table 1. These
animals are useful for the study of the function of ion

25   channels, to study the mechanisms by which combinations of
mutations in ion channel subunits interact to give rise to
disease and the effects of these mutations on tissue
development, for the screening of candidate pharmaceutical
compounds, for the creation of explanted mammalian cell

30   cultures which express mutant ion channels or combinations
of mutant ion channels, and for the evaluation of
potential therapeutic interventions.   .
       Animal species which are suitable for use in the
animal models of the present invention include, but are

35   not limited to, rats, mice, hamsters, guinea pigs,
rabbits, dogs, cats, goats, sheep, pigs, and non-human
primates such as monkeys and chimpanzees. For initial

studies, genetically modified mice and rats are highly desirable due to the relative ease in generating knock-in, knock-out or transgenics of these animals, their ease of maintenance and their shorter life spans. For certain 5   studies, transgenic yeast or invertebrates may be suitable and preferred because they allow for rapid screening and provide for much easier handling. For longer term studies, non-human primates may be desired due to their similarity with humans.

10   To create an animal model for a mutated ion channel, or an animal model incorporating a combination of mutations, several methods can be employed. These include, but are not limited to, generation of a specific mutation in a homologous animal gene, insertion of a wild type 15   human gene and/or a humanized animal gene by homologous recombination, insertion of a mutant (single or multiple) human gene as genomic or minigene cDNA constructs using wild type or mutant or artificial promoter elements, or insertion of artificially modified fragments of the 20   endogenous gene by homologous recombination. The modifications include insertion of mutant stop codons, the deletion of DNA sequences, or the inclusion of recombination elements (lox p sites) recognized by enzymes such as Cre recombinase.

25   To create transgenic mice in order to study gain of gene function *in vivo*, any mutant ion channel subunit gene of the invention can be inserted into a mouse germ line using standard techniques such as oocyte microinjection. Gain of gene function can mean the over-expression of a 30   gene and its protein product, or the genetic complementation of a mutation of the gene under investigation. For oocyte injection, one or more copies of the mutant gene can be inserted into the pronucleus of a just-fertilized mouse oocyte. This oocyte is then 35   reimplanted into a pseudo-pregnant foster mother. The live-born mice can then be screened for integrants using analysis of tail DNA for the presence of the relevant

human ion channel subunit gene sequence. The transgene can be either a complete genomic sequence injected as a YAC, BAC, PAC or other chromosome DNA fragment, a cDNA with either the natural promoter or a heterologous promoter, or a minigene containing all of the coding region and other elements found to be necessary for optimum expression.

To generate knock-out mice or knock-in mice, gene targeting through homologous recombination in mouse embryonic stem (ES) cells may be applied. Knock-out mice are generated to study loss of gene function *in vivo* while knock-in mice (which are preferred) allow the study of gain of function or to study the effect of specific gene mutations. Knock-in mice are similar to transgenic mice however the integration site and copy number are defined in the former.

For knock-out mouse generation, gene targeting vectors can be designed such that they delete (knock-out) the protein coding sequence of the relevant ion channel subunit gene in the mouse genome. In contrast, knock-in mice can be produced whereby a gene targeting vector containing the relevant ion channel subunit gene can integrate into a defined genetic locus in the mouse genome. For both applications, homologous recombination is catalysed by specific DNA repair enzymes that recognise homologous DNA sequences and exchange them via double crossover.

Gene targeting vectors are usually introduced into ES cells using electroporation. ES cell integrants are then isolated via an antibiotic resistance gene present on the targeting vector and are subsequently genotyped to identify those ES cell clones in which the gene under investigation has integrated into the locus of interest. The appropriate ES cells are then transmitted through the germline to produce a novel mouse strain.

In instances where gene ablation results in early embryonic lethality, conditional gene targeting may be employed. This allows genes to be deleted in a temporally

and spatially controlled fashion. As above, appropriate ES
cells are transmitted through the germline to produce a
novel mouse strain, however the actual deletion of the
gene is performed in the adult mouse in a tissue specific
5   or time controlled manner. Conditional gene targeting is
most commonly achieved by use of the cre/lox system. The
enzyme cre is able to recognise the 34 base pair loxP
sequence such that loxP flanked (or floxed) DNA is
recognised and excised by cre. Tissue specific cre
10   expression in transgenic mice enables the generation of
tissue specific knock-out mice by mating gene targeted
floxed mice with cre transgenic mice. Knock-out can be
conducted in every tissue (Schwenk et al., 1995) using the
'deleter' mouse or using transgenic mice with an inducible
15   cre gene (such as those with tetracycline inducible cre
genes), or knock-out can be tissue specific for example
through the use of the CD19-cre mouse (Rickert et al.,
1997).

Once knock-in animals have been produced which
20   contain a specific mutation in a particular ion channel
subunit, mating combinations may be initiated between such
animals so as to produce progeny containing combinations
of two or more ion channel mutations. These animals
effectively mimic combinations of mutations that are
25   proposed to cause human IGE cases. These animal models can
subsequently be used to study the extent and mechanisms of
disease as related to the mutated ion channel
combinations, as well as for the screening of candidate
therapeutic compounds.

30   According to still another aspect of the invention
there is provided the use of genetically modified non-
human animals as described above for the screening of
candidate pharmaceutical compounds (see drug screening
above). These animals are also useful for the evaluation
35   (eg therapeutic efficacy, toxicity, metabolism) of
candidate pharmaceutical compounds, including those
identified from the invention as described above, for the

treatment of epilepsy as well as other as other disorders associated with ion channel dysfunction as described above.

It will be clearly understood that, although a number
5   of prior art publications are referred to herein, this reference does not constitute an admission that any of these documents forms part of the common general knowledge in the art, in Australia or in any other country.

Throughout this specification and the claims, the
10   words "comprise", "comprises" and "comprising" are used in a non-exclusive sense, except where the context requires otherwise.

It will be apparent to the person skilled in the art that while the invention has been described in some detail
15   for the purposes of clarity and understanding, various modifications and alterations to the embodiments and methods described herein may be made without departing from the scope of the inventive concept disclosed in this specification.
20

Brief Description of the Drawings

Preferred forms of the invention will now be described, by way of example only, with reference to the following examples and the accompanying drawings, in
25   which:

Figure 1 provides an example of ion channel subunit stoichiometry and the effect of multiple versus single ion channel subunit mutations. Figure 1A: A typical channel may have five subunits of three different types. Figure
30   1B: In outbred populations complex diseases such as idiopathic generalized epilepsies may be due to mutations in two (or more) different subunit genes. Because only one allele of each subunit gene is abnormal, half the expressed subunits will have the mutation. Figure 1C: In
35   inbred populations, both alleles of a single subunit gene will be affected, so all expressed subunits will be mutated. Figure 1D: Autosomal dominant disorders can be

attributed to single ion channel subunit mutations that give rise to severe functional consequences.

Figure 2 represents the location of mutations identified in the KCNQ2 ion channel subunit constituting
5   the potassium channel. M: Missense mutation; T: Truncation mutation; F: Frameshift mutation; S: Splice site mutation.

Figure 3 provides examples of epilepsy pedigrees where mutation profiles of ion channel subunits for individuals constituting the pedigree have begun to be
10   determined. These examples have been used to illustrate how the identification of novel ion channel subunit mutations and variations in IGE individuals can combine to give rise to the disorder.

Figure 4 shows the results of yeast two-hybrid
15   analysis of R353G and L619R KCNQ2 mutants. Yeast were transformed with the empty DB (BAIT) plasmid (DBLeu), DB-Q2C wt, DB-Q2C R353G mutant or the DB-Q2 L619R mutant as indicated in A and the AD-CaM (TARGET) vector was introduced by gap-repair. Yeast control strains
20   (Invitrogen™) were included on all plates for comparison. Control 1 has no interaction. Control 2 has a weak interaction. Control 3 has a moderately strong interaction. Control 4 has a strong interaction and control 5 has a very strong interaction. B. Growth of
25   transformed yeast and controls on -leu   -tryp selection. Yeast can grow on -leu if they contain the DB plasmid, and -tryp if they have AD plasmid. C. Growth of transformed yeast and controls on -leu -tryp -his +40mM 3AT after 48hrs. Yeast can grow on -his+3AT if the *his* reporter gene
30   is activated by interaction between the BAIT and TARGET plasmids. D-F. *LacZ* Filter assay for interaction between BAIT and TARGET plasmids, photos taken after 2hrs (D), 7hrs (E) and 24hrs (F). Activation of the β-*galactosidase* reporter gene by interaction of the BAIT and TARGET
35   plasmids leads to the dark appearance of colonies.

Figure 5 shows the results of CaM affinity experiments with the R353G and L619R KCNQ2 mutants. The

chart below shows the values from the CPRG assay for β-galactosidase activity as a measure of KCNQ2C-CaM binding efficiency. The area of each bar in the chart equates to the CaM binding efficiency of the BAIT. Broken lines
5   indicate statistical comparison by Student's _t_ test * P<0.01, ** P<0.001.

Modes for Performing the Invention

Potassium channels are the most diverse class of ion
10   channel. The _C. elegans_ genome encodes about 80 different potassium channel genes and there are probably more in mammals. About ten potassium channel genes are known to be mutated in human disease and include four members of the KCNQ gene sub-family of potassium channels. KCNQ proteins
15   have six transmembrane domains, a single P-loop that forms the selectivity filter of the pore, a positively charged fourth transmembrane domain that probably acts as a voltage sensor, and intracellular amino and carboxy termini. The C-terminus is long and contains a conserved
20   "A domain" followed by a short stretch thought to be involved in subunit assembly.

Four KCNQ subunits are thought to combine to form a functional potassium channel. All five known KCNQ proteins can form homomeric channels _in vitro_ and the formation of
25   heteromers appears to be restricted to certain combinations. For instance KCNQ2 and KCNQ3, which are predominantly expressed in the central nervous system, form a heteromultimeric channel that mediates the neuronal muscarinic-regulated current (M-current), also known as
30   the M-channel (or M-type K^+ channel). The M-current is a slowly activating, non-inactivating potassium conductance known to regulate neuronal excitability by determining the firing properties of neurons and their responsiveness to synaptic input (Wang et al., 1998). Because it is the only
35   current active at voltages near the threshold for action potential initiation, the M-current has a major impact on neuronal excitability.

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Sodium (the alpha subunit) and calcium channels are thought to have evolved from the potassium channel subunit, and they each consist of four domains covalently linked as the one molecule, each domain being equivalent to one of the subunits that associate to form the potassium channel. Each of the four domains of the sodium and calcium channels are comprised of six transmembrane segments.

Voltage-gated sodium channels are required to generate the electrical excitation in neurones, heart and skeletal muscle fibres, which express tissue specific isoforms. Sodium channels are heteromers of a pore forming alpha subunit and a modulatory beta-1 subunit, with an additional beta-2 subunit in neuronal channels. Ten genes encoding sodium channel alpha subunits and 3 genes encoding different beta subunits have so far been identified. The beta subunits of the sodium channels do not associate with the alpha subunits to form any part of the pore, they do however affect the way the alpha pore forming subunit functions.

As with sodium channels, calcium channels consist of a single pore forming alpha subunit, of which at least six types have been identified to date, and several accessory subunits including four beta, one gamma and one alpha2-delta gene. Many of these subunits also encode multiple splice variants adding to the diversity of receptor subunits of this family of ion channels.

The ion channels in the nAChR/GABA super family show a theoretical pentameric channel. Gamma-Aminobutyric acid (GABA) is the most abundant inhibitory neurotransmitter in the central nervous system. GABA-ergic inhibition is mediated by two major classes of receptors, type A (GABA-A) and type B (GABA-B). GABA-B receptors are members of the class of receptors coupled to G-proteins and mediate a variety of inhibitory effects via secondary messenger cascades. GABA-A receptors are ligand-gated chloride channels that mediate rapid inhibition.

The GABA-A channel has 16 separate, but related, genes encoding subunits. These are grouped on the basis of sequence identity into alpha, beta, gamma, delta, epsilon, theta and pi subunits. There are six alpha subunits ($\alpha1$-$\alpha6$), three beta subunits ($\beta1$-$\beta3$) and three gamma subunits ($\gamma1$-$\gamma3$). Each GABA-A receptor comprises five subunits which may, at least in theory, be selected from any of these subunits.

Neuronal nicotinic acetylcholine receptors (nAChRs) consist of heterologous pentamers comprising various combinations of alpha subunits or alpha and beta subunits ($\alpha2$-$\alpha9$; $\beta2$-$\beta4$). The alpha subunits are characterised by adjacent cysteine residues at amino acid positions 192 and 193, and the beta subunits by the lack of these cysteine residues. They are ligand-gated ion channels differentially expressed throughout the brain to form physiologically and pharmacologically distinct receptors hypothesised to mediate fast, excitatory transmission between neurons of the central nervous system or to modulate neurotransmission from their presynaptic position.

In chicken and rat, the predominant nAChR subtype is composed of alpha-4 and beta-2 subunits. The transmembrane 2 (M2) segments of the subunits are arranged as alpha helices and contribute to the walls of the neurotransmitter-gated ion channel. The alpha helices appear to be kinked and orientated in such a way that the side chains of the highly conserved M2-leucine residues project inwards when the channel is closed. ACh is thought to cause a conformational change by altering the association of the amino acid residues of M2. The opening of the channel seems to be due to rotations of the gate forming side chains of the amino acid residues; the conserved polar serines and threonines may form the critical gate in the open channel.

Example 1: Identification of mutations in ion channels

Previous studies by reference (Wallace et al., 1998; PCT/AU01/00581; Wallace et al., 2001b; Australian patent AU-B-56247/96; Steinlein et al., 1995; PCT/AU01/00541; Phillips et al., 2001; PCT/AU01/00729; PCT/AU01/01648; PCT/AU02/00910; Wallace et al., 2001a, the disclosures of which are incorporated herein by reference) have identified mutations in a number of ion channel subunits associated with epilepsy. These include ion channel subunits of voltage-gated (eg SCN1A, SCN1B, KCNQ2, KCNQ3) or ligand-gated (eg CHRNA4, CHRNB2, GABRG2, GABRD) types. To identify further mutations in ion channel genes, subunits which comprise the ion channels were screened for molecular defects in epilepsy patients.

Human genomic sequence available from the Human Genome Project was used to characterize the genomic organisation for each subunit gene. Each gene was subsequently screened for sequence changes using single strand conformation polymorphism (SSCP) analysis in a large sample of epileptics with common sporadic IGE subtypes eg juvenile myoclonic epilepsy (JME), childhood absence epilepsy (CAE), juvenile absence epilepsy (JAE) and epilepsy with generalized tonic-clonic seizures (TCS). Clinical observations can then be compared to the molecular defects characterized in order to establish the combinations of mutant subunits involved in the various disease states, and therefore to provide validated drug targets for each of these disease states. This will provide a basis for novel drug treatments directed at the genetic defects present in each patient.

The coding sequence for each of the ion channel subunits was aligned with human genomic sequence present in available databases at the National Centre for Biotechnology Information (NCBI). The BLASTN algorithm was typically used for sequence alignment and resulted in the genomic organisation (intron-exon structure) of each gene being determined. Where genomic sequence for an ion

channel subunit was not available, BACs or PACs containing
the relevant ion channel subunit were identified through
screening of high density filters containing these clones
and were subsequently sequenced.

5   Availability of entire genomic sequence for each ion
channel subunit facilitated the design of intronic primers
spanning each exon. These primers were used for both high
throughput SSCP screening and direct DNA sequencing.

10   Example 2: Sample preparation for SSCP screening
          A large collection of individuals affected with
epilepsy have undergone careful clinical phenotyping and
additional data regarding their family history has been
collated. Informed consent was obtained from each
15   individual for blood collection and its use in subsequent
experimental procedures. Clinical phenotypes incorporated
classical IGE cases as well as GEFS+ and febrile seizure
cases.
          DNA was extracted from collected blood using the
20   QIAamp DNA Blood Maxi kit (Qiagen) according to
manufacturers specifications or through procedures adapted
from Wyman and White (1980). Stock DNA samples were kept
at a concentration of 1 ug/ul.
          In preparation for SSCP analysis, samples to be
25   screened were formatted into 96-well plates at a
concentration of 30 ng/ul. These master plates were
subsequently used to prepare exon specific PCR reactions
in the 96-well format.

30   Example 3: Identification of sequence alterations in ion
channel genes
          SSCP analysis of specific ion channel exons followed
by sequencing of SSCP bandshifts was performed on
individuals constituting the 96-well plates to identify
35   sequence alterations.
          Primers used for SSCP were labelled at their 5' end
with HEX and typical PCR reactions were performed in a

total volume of 10 µl. All PCR reactions contained 67 mM
Tris-HCl (pH 8.8); 16.5 mM $(NH_4)_2SO_4$; 6.5 µM EDTA; 1.5 mM
$MgCl_2$; 200 µM each dNTP; 10% DMSO; 0.17 mg/ml BSA; 10 mM β-
mercaptoethanol; 5 µg/ml each primer and 100 U/ml *Taq* DNA
5   polymerase. PCR reactions were typically performed using
10 cycles of 94°C for 30 seconds, 60°C for 30 seconds, and
72°C for 30 seconds followed by 25 cycles of 94°C for 30
seconds, 55°C for 30 seconds, and 72°C for 30 seconds. A
final extension reaction for 10 minutes at 72°C followed.

10   Ten to twenty µl of loading dye comprising 50% (v/v)
formamide, 12.5 mM EDTA and 0.02% (w/v) bromophenol blue
were added to completed reactions which were subsequently
run on non-denaturing 4% polyacrylamide gels with a cross-
linking ratio of 35:1 (acrylamide:bis-acrylamide) and
15   containing 2% glycerol. Gel thickness was 100µm, width
168mm and length 160mm. Gels were run at 1200 volts and
approximately 20mA, at 18°C and analysed on the GelScan
2000 system (Corbett Research, Australia) according to
manufacturers specifications.

20   PCR products showing a conformational change were
subsequently sequenced. This first involved re-
amplification of the amplicon from the relevant individual
(primers used in this instance did not contain 5' HEX
labels) followed by purification of the PCR amplified
25   templates for sequencing using QiaQuick PCR preps (Qiagen)
based on manufacturers procedures. The primers used to
sequence the purified amplicons were identical to those
used for the initial amplification step. For each
sequencing reaction, 25 ng of primer and 100 ng of
30   purified PCR template were used. The BigDye sequencing kit
(ABI) was used for all sequencing reactions according to
the manufacturers specifications. The products were run on
an ABI 377 Sequencer and analysed using the EditView
program.

35   Table 1 shows the novel sequence changes identified
in the ion channel subunits screened.

Example 4: Digenic model examples

In some instances a single mutation in an ion channel alone is insufficient to give rise to an epilepsy phenotype. However combinations of mutations each conferring a subtle change of function to an ion channel, as proposed by the digenic model (PCT/AU01/00872), may be sufficient to produce an epilepsy phenotype.

Using mutations and variations in ion channel subunits previously identified, the digenic model may be validated through a parametric analysis of large families in which two abnormal alleles co-segregate by chance to identify mutations which act co-operatively to give an epilepsy phenotype. It is envisaged that the strategy of careful clinical phenotyping in these large families, together with a linkage analysis based on the digenic hypothesis will allow identification of the mutations in ion channels associated with IGEs. If molecular genetic studies in IGE are successful using the digenic hypothesis, such an approach might serve as a model for other disorders with complex inheritance.

The digenic hypothesis predicts that the closer the genetic relationship between affected individuals, the more similar the sub-syndromes, consistent with published data (Italian League Against Epilepsy Genetic Collaborative Group, 1993). This is because more distant relatives are less likely to share the same combinations of mutated subunits.

Identical twins have the same pair of mutated subunits and the same minor alleles so the sub-syndromes are identical. Affected sib-pairs, including dizygous twins, with the same sub-syndrome would also have the same pair of mutated subunits, but differences in minor alleles would lead to less similarity than with monozygous twins. Some sib-pairs and dizygous twins, have quite different sub-syndromes; this would be due to different combinations of mutated subunits, when the parents have more than two mutated alleles between them.

A special situation exists in inbred communities that parallels observations on autosomal recessive mouse models. Here the two mutated alleles of the digenic model are the same and thus result in a true autosomal recessive disorder. Because all affected individuals have the same pair of mutated alleles, and a similar genetic background, the phenotypes are very similar.

In outbred communities approximately 1% of the population would have IGE genotypes (2 mutated alleles) and 0.3% would clinically express IGE. Most of these would have mutations in two different channel subunits. In such communities most cases would appear "sporadic" as the risk to first degree relatives would be less than 10%.

For example, let there be three IGE loci (A,B,C) and let the frequency of abnormal alleles (a*,b*,c*) at each locus be .027 and of normal alleles (a, b, c) be .973. Then, the distribution of genotypes aa*, a*a, a*a* and aa at locus A will be .0263 (.027 x .973), .0263, .0007 and .9467 respectively, and similarly for loci B and C. In this population .8485 will have no mutated alleles ($.9467^3$), .1413 will have one mutated allele (a* or b* or c*; .0263 x $.9467^2$ x 6), .0098 will have two abnormal alleles (.0020 two same abnormal alleles, .0078, two different abnormal alleles) and 0.00037 will have more than two abnormal alleles. Thus in this population .01, or 1%, will have two or more abnormal alleles (IGE genotype), and the total abnormal allele frequency will be .08 (3 x .027).

To determine the familial risks and allele patterns in affected pairs, the frequency distribution of population matings and the percentage of children with 2 or more abnormal alleles must be determined. The frequency of matings with no abnormal alleles (0 x 0) is .72 ($.8485^2$), for 1 x 0 and 0 x 1 matings .24 (2 x .8485 x .1413), for a 1 x 1 mating .020, and for 2 x 0 and 0 x 2 matings .0166 etc. From this distribution of matings the frequency of children with 2 or more abnormal alleles can

be shown to be .01. For example, the 0 x 2 and 2 x 0
matings contribute .0033 of this .01 frequency (.0166
[mating frequency] x .2 [chance of that mating producing a
child with 2 or more abnormal alleles]).

To determine parental risk it can be shown that of
children with 2 abnormal alleles (IGE genotype), .49
derive from 1 x 1 matings where no parent is affected, .33
derive from a 2 x 0 and 0 x 2 matings etc. For the 2 x 0
and 0 x 2 matings, half the parents have IGE genotypes and
contribute .16 (.33/2) to the parental risk with the total
parental risk of an IGE genotype being .258. The other
matings that contribute to affected parent-child pairs are
2 x 1, 1 x 2, 3 x 0, 0 x 3 etc.

The sibling risk of an IGE genotype is .305. For
example 2 x 0 and 0 x 2 matings contributed .08 to the
sibling risk (.33[fraction of children with 2 abnormal
alleles] x .25[the chance of that mating producing a child
with 2 or more abnormal alleles]). Similarly the offspring
risk was determined to be .248 by mating individuals with
2 abnormal alleles with the general population. Thus at
30% penetrance the risk for IGE phenotype for parents of a
proband is .077, for siblings .091, and for offspring
.074.

It can be shown that affected sib pairs share the
same abnormal allele pair in 85% of cases. This is because
of all affected sib pairs 44% derive from 1 x 1 matings
and 23% from 0 x 2 and 2 x 0 matings where all affected
siblings have the same genotype. In contrast, 24% derive
from 1 x 2 matings and 9% from 3 x 1 and 2 x 2 matings etc
where affected sibling genotypes sometimes differ.

For affected parent-child pairs, genotypes are
identical in only 58%. Of affected parent child pairs, 43%
derive from 0 x 2 matings where gentoypes are identical,
whereas 38% derive from 0 x 3 and 17% from 1 x 2 where the
majority of crosses yield different affected genotypes.

Based on the digenic model it has been postulated
that most classical IGE and GEFS[+] cases are due to the

combination of two mutations in multi-subunit ion channels. These are typically point mutations resulting in a subtle change of function. The critical postulate is that two mutations, usually, but not exclusively, in

5   different subunit alleles ("digenic model"), are required for clinical expression of IGE.

The hypothesis that similar phenotypes can be caused by the combination of mutations in two (or more) different subunits (outbred communities), or by the same mutation in

10 two (or more) alleles of the same subunit (inbred communities), may seem implausible. However, applying the digenic hypothesis to the theoretical pentameric channel shown in Figure 1, in outbred communities IGE will be due to subunit combinations such as $\alpha^*\alpha\beta^*\beta\Delta$, $\alpha^*\alpha\beta\beta\Delta^*$ or $\alpha\alpha\beta^*\beta\Delta^*$

15 (mutated subunits indicated by *). In inbred communities $\alpha^*\alpha^*\beta\beta\Delta$ or $\alpha\alpha\beta^*\beta^*\Delta$ combinations might cause IGE phenotypes. We assume that the mutations will not cause reduced expression of the alleles and that the altered ion channel excitability, and consequent IGE phenotype, caused by

20 mutations in two different alleles is similar to that caused by the same mutation in both alleles of one subunit. Finally, subunit mutations with more severe functional consequences (eg breaking a disulphide bridge in SCN1B or amino acid substitution in the pore forming

25 regions of SCN1A for GEFS[+]) cause autosomal dominant generalized epilepsies with a penetrance of 60-90%. Such "severe" mutations are rare (allele frequency <0.01%) and are infrequent causes of GEFS[+]. They very rarely, or perhaps never, cause classical IGE.

30 The relative separate segregation of classical IGE and GEFS[+] phenotypes is an anecdotal clinical observation of ours (Singh et al., 1999), although the separation is not absolute. The separation is supported by previous family and EEG studies of Doose and colleagues who

35 described "type A" and "type B" liabilities which we may approximate the GEFS[+] and classical IGE groupings respectively (Doose and Baier, 1987).

The digenic model predicts that affected sib pairs will share the same genes in 85% of cases whereas they will have at least one different allele in the remaining 15%. In contrast, only 58% of parent-child pairs share the same alleles in a 3 locus model. Thus there should be greater similarity of syndromes between sibling pairs than parent-child pairs. This would be most objectively measured by age of onset and seizure types.

Estimates for the risk of febrile seizures or IGE in relatives vary. The estimates range from 5%-10% for siblings, 4%-6% for offspring, 3%-6% for parents, and 2-3% for grandparents. Underestimation may occur because IGE manifest in youth, and parents and particularly grandparents may be unaware of seizures in themselves in younger years. This is particularly true where there was stigma associated with epilepsy and where the epilepsy may have been mild and unrecognized. Underestimation of sibling and offspring risks occurs when unaffected young children are counted, some of whom will develop IGE in adolescence. Overestimation may occur with misdiagnosis of seizures or inclusion of seizures unrelated to IGE (e.g. due to trauma or tumors)

In autosomal dominant models the risk to affected relatives reduces proportionally (50% for first degree relatives, 25% for second degree etc). For all oligogenic or polygenic models the risk decreases more quickly. For a digenic model with three loci, the risks are 9.1% for siblings, 7.4% for offspring, 7.7% for parents. Rigorous measurement of the familial recurrence rates, with careful phenotyping and age-corrected risk estimates could be compared with the predictions from the digenic model, and it is proposed to do this.

There is a small amount of information on IGE families regarding haplotype distribution. For example, there is some evidence for a locus on 8q as determined by parametric linkage in a single family (Fong et al., 1998) and by non-parametric analysis in multiple small families

(Zara et al., 1995). Interestingly, in the latter study the 8q haplotype not infrequently came from the unaffected parent. This would be quite compatible with the digenic model and evaluation of other data sets in this manner
5   could be used to test the hypothesis, and it is proposed to do this.

Following the analysis of one large family with epilepsy where the two main phenotypes were childhood absence epilepsy (CAE) and febrile seizures (FS), the
10   inheritance of FS was found to be autosomal dominant and the penetrance 75%. However the inheritance of CAE in this family was not simple Mendelian, but suggestive of complex inheritance with the involvement of more than one gene. The power of this large family was used to explore the
15   complex genetics of CAE further.

Linkage analysis on this family in which individuals with CAE, FS and FS+ were deemed affected led to the detection of linkage on chromosome 5q and identification of a mutation in the GABRG2 gene (R43Q) which is localised
20   to this region (Wallace et al., 2001a; PCT/AU01/00729). All 10 tested individuals with FS alone in this family had this mutation and 7 CAE affected individuals in this family also had the mutation. To test the digenic model of IGEs in the CAE affected individuals, the whole genome
25   screen of this family was reanalysed with only individuals with CAE considered affected. Linkage analysis was performed using FASTLINK v4.0, two-point lod scores were calculated assuming 50% penetrance and a 2% phenocopy rate and individuals with FS or FS+ were coded as unknown.
30   Markers producing a lod score greater than 1 were reanalysed without a phenocopy rate and at the observed penetrance for CAE in this family (30%). Results from the analysis revealed significant linkage to chromosome 14q22-q23 (lod 3.4). This provides strong evidence for a second
35   locus segregating with CAE affected individuals in this family. While the GABRG2 mutation is sufficient to cause FS, the CAE phenotype is thought to be due to both the

GABRG2 mutation and a mutation occurring in a gene mapping to the 14q locus, as proposed by the digenic model.

For the application of the digenic model to sporadic cases of IGE and affected individuals belonging to smaller families in which genotyping and linkage analysis is not a feasible approach to disease gene identification, direct mutation analysis of ion channel genes in these individuals has been carried out as described above. In Table 1 there is provided an indication of novel genetic alterations so far identified through mutation analysis screening of these individuals. Figure 2 provides an example to indicate where some of these mutations have occurred with respect to the potassium channel KCNQ2 gene.

The identification of novel mutations and variations in ion channel subunits in IGE individuals provides resources to further test the digenic hypothesis and mutation profiles are starting to accumulate for a number of subunit changes that are observed in the same individuals. Figure 3 provides results from some of these profiles.

Figure 3A shows a 3 generation family in which individual III-1 has myoclonic astatic epilepsy and contains a N43del mutation in the SCN3A gene as well as an A1067T mutation in the SCN1A gene. Individual I-1 also has the SCN3A mutation but alone this mutation is not sufficient to cause epilepsy in this individual. The SCN3A mutation has likely been inherited from the grandfather through the mother, while the SCN1A mutation is likely to arise from the father. Both parents are unaffected but have yet to be screened for the presence of the mutations in these subunits. Individual II-1 is likely to contain an as yet unidentified ion channel subunit mutation acting in co-operation with the SCN3A mutation already identified in this individual.

Figure 3B is another 3 generation family in which individual III-1 has myoclonic astatic epilepsy due to a combination of the same SCN3A and SCN1A mutations as

above. However, in this family both parents have febrile seizures most likely due to the presence of just one of the mutations in each parent, as proposed by the model. This is in contrast to individuals II-2 and II-3 in Figure 4A who also contain one of the mutations in these genes each. These individuals are phenotypically normal most likely due to incomplete penetrance of these mutations in each case.

Figure 3C shows a larger multi-generation family in which individual IV-5 has a mutation in both the SCN3A and GABRG2 subunits. In combination, these give rise to severe myoclonic epilepsy of infancy but alone either cause febrile seizures (GABRG2 mutation in III-3 and IV-4) or are without an effect (SCN3A mutation in III-2) as proposed by the model.

These examples therefore illustrate the digenic model as determined from mutation analysis studies of ion channel subunits in affected individuals and highlight the need to identify genetic alterations in the genes encoding ion channel subunits.

Example 5: Analysis of ion channels and ion channel subunits

The structure and function of the mutant ion channels and mutant ion channel subunits of the present invention can be determined using a variety of molecular biological studies. These studies may provide clues as to the mechanisms by which mutations in ion channel subunits effect the functioning of the ion channel. For instance the identification of proteins that interact with mutant ion channels (or whose interaction is impeded by a mutation in an ion channel subunit) may help determine the molecular mechanisms that are disrupted as a result of a mutation. Procedures such as the yeast two-hybrid system can be used to discover and identify such interacting proteins.

The principle behind the yeast two-hybrid procedure is that many eukaryotic transcriptional activators, including those in yeast, consist of two discrete modular domains. The first is a DNA-binding domain that binds to a
5   specific promoter sequence and the second is an activation domain that directs the RNA polymerase II complex to transcribe the gene downstream of the DNA binding site. Both domains are required for transcriptional activation as neither domain can activate transcription on its own.
10 In the yeast two-hybrid procedure, the gene of interest or parts thereof (BAIT), is cloned in such a way that it is expressed as a fusion to a peptide that has a DNA binding domain. A second gene, or number of genes, such as those from a cDNA library (TARGET), is cloned so that it is
15 expressed as a fusion to an activation domain. Interaction of the protein of interest with its binding partner brings the DNA-binding peptide together with the activation domain and initiates transcription of the reporter genes. The first reporter gene will select for yeast cells that
20 contain interacting proteins (this reporter is usually a nutritional gene required for growth on selective media). The second reporter is used for confirmation and while being expressed in response to interacting proteins it is usually not required for growth.
25

KCNQ2 interactors

Despite the identification of a number of KCNQ2 mutations responsible for epilepsy, including those of the present study, the underlying biological mechanisms
30 responsible for the epilepsy remains largely uncharacterized. Towards identifying these mechanisms, the large intracellular C-terminal region of KCNQ2 was screened for interactions with other proteins using the yeast-two hybrid procedure. The C-terminus accounts for
35 63% of the KCNQ2 protein and, in common with other KCNQ subunits, contains a conserved 'A domain' (Jentsch, 2000; Schwake et al., 2000) thought to be involved in subunit

interactions as well as another distal short conserved
region that has been associated with subunit assembly, at
least in KCNQ1 (Jentsch, 2000; Schmitt et al., 2000).

5   **A) Yeast-two hybrid analysis**

         A yeast two-hybrid screen was carried out using the
ProQuest™ Two-Hybrid System with Gateway™ Technology
(Invitrogen™) according to manufacturer's directions. A
KCNQ2 C-terminal entry (BAIT) clone was generated using
10   the pENTR Directional TOPO® Cloning Kit (Invitrogen™). The
following primers were designed to amplify the
intracellular C-terminal region of KCNQ2 based on the
sequence of human KCNQ2 (Genbank accession number
NM_172107): KCNQ2F: 5'-CACCAAGGTTCAGGAGCAGCACAGG-3' and
15   KCNQ2R: 5'-TCACTTCCTGGGCCCGGCCCAGCC-3'. The 1611 base pair
cloned fragment included exon 10a (found in all our
amplified clones), corresponding to amino acid 373-382 of
the KCNQ2 protein. The extra 30 base pairs (10 amino
acids) were included in our numbering. The PCR-product was
20   cloned into the pENTR/D-TOPO® vector (Invitrogen™) via the
TOPO® Cloning reaction according to the manufacturer's
instructions. Following sequence verification, the KCNQ2
cDNA fragment was then subcloned into pDEST™32, the DNA
Binding domain (DB) Gateway™ Destination Vector
25   (Invitrogen™).

         The ProQuest™ Two-Hybrid human brain cDNA Library
(TARGET) with Gateway™ technology (ResGen™, Invitrogen™
Corporation) was amplified according to the manufacturer's
instructions. Plasmid DNA was purified from the cell
30   pellet using the HiSpeed Plasmid Maxi Kit (Qiagen)
according to the manufacturer's instructions.

         Both the DBLeu (empty bait vector) and DB-KCNQ2 wild-
type (wt) C-term BAITS were transformed into the yeast
strain Mav203 and plated onto minimal selective media
35   lacking leucine. A duplicate was carried out where the
empty library TARGET (pAD) vector was co-transformed in
addition to each BAIT and plated onto minimal selective

media lacking leucine (-leu) and tryptophan (-tryp). Yeast
control strains (Invitrogen™) were included on all plates.
Control 1, used as a negative control, contained empty
plasmids pPC97 and pPC86. Control 2 had pPC97-RB and
5   pPC86-E2F1, which express a relatively weak interaction.
Control 3 contained plasmids encoding the *Drosophila* DP
(pPC97) and E2F (pPC86) domains that have a moderately
strong interaction, and provide a control for plasmid
shuffling. Control 4 contained pPC97-Fos and pPC86-Jun
10   which express a relatively strong interaction, and control
5 had a pCL1 plasmid encoding full-length GAL4p and empty
pPC86 and was used as a positive control.

The constructs were tested for self-activation of the
his and β-*gal* reporter genes according to Invitrogen™
15   instructions.

For the yeast-two hybrid screen, competent yeast
cells were prepared for each BAIT (DB-KCNQ2 wt C-term
construct) to be screened, transformed with 31μg of
ProQuest™ Two-Hybrid human brain AD (activation domain)-
20   cDNA Library and plated onto minimal selective media
lacking leucine (-leu), tryptophan (-tryp) and histidine
(-his) and containing 3-aminotriazole (+3AT). Positive
colonies from each screen were PCR-amplified and re-
introduced into fresh yeast cells containing the BAIT to
25   re-test for two-hybrid interaction phenotypes. Those
giving rise to more than one PCR product or that failed to
re-test positively were systematically eliminated.
Positives that re-tested were sequenced using the ABI
PRISM® BigDye™ Terminators v3.0 technology. Once
30   identified, the sequence of the potential interactor was
checked to verify it was in the same translational frame
as the Gal4p-AD encoding sequence of the prey construct.

Approximately 3 x 10⁶ clones from the ProQuest™ Two-
Hybrid human brain cDNA Library were screened for
35   interaction with the DB-Q2C wt bait. Among 1039 positive
AD-cDNAs recovered, re-tested and subsequently sequenced

all were identified as the CALM2 gene, encoding the ubiquitous, Ca^{2+}-binding protein, Calmodulin (CaM).

The interaction between the C-terminal region of KCNQ2 and CaM has also been reported by other studies (Wen and Levitan, 2002; Yus-Najera et al., 2002; Gamper and Shapiro, 2003). In mammals, the CaM protein is coded by a multigene family consisting of three bona fide members, CALM1, CALM2 and CALM3. Within the non-coding regions of the CaM transcripts, no striking homology is observed, and codon usage is maximally divergent amongst the three CaM mRNAs that encode an identical protein. It has been hypothesised that the existence of a multigene family provides a tight and complex level of regulatory control at the level of gene expression (Palfi et al., 2002). CaM genes are differentially expressed in the CNS during development and differential regulation of the CaM genes appears necessary to maintain the temporal and spatial fidelity of the CaM protein levels in all subcellular domains. Besides the fundamental housekeeping functions associated with CaM, it is also involved in specialized neuronal functions, such as the synthesis and release of neurotransmitters, neurite extension, long-term potentiation and axonal transport (Palfi et al., 2002).

B) Effect of epilepsy-associated KCNQ2 mutations on the CaM-KCNQ2 interaction

To assess the effect that the C-terminus mutations of the present invention had on CaM binding, two of the identified mutations (R353G and L619R) were introduced into the DB-Q2C construct by mutagenesis and were re-analysed for an interaction with CaM using the yeast two-hybrid procedure.

The following primers were used to incorporate the c1057C→G (R353G) and c1856T→G (L619R) changes into the pDEST™32- KCNQ2 C-terminal bait construct.

R353G F 5'-CGCCACCAACCTCTCGGGCACAGACCTGCACTC-3'

R353G R 5'-GAGTGCAGGTCTGTGCCCGAGAGGTTGGTGGCG-3'
L619R F 5'-CTTGTCCATGGAGAAGAAGCGGGACTTCCTGGTGAATATC-3'
L619R R 5'-GATATTCACCAGGAAGTCCCGCTTCTTCTCCATGGACAAG-3'

5   Overlapping PCR products were generated using the
TOPO® cloning compatible KCNQ2F primer from the initial
cloning and the mutagenesis reverse primers, and the
KCNQ2R primer from the initial cloning with the
mutagenesis forward primers. Products were gel extracted
10   and purified before a second round of PCR using the
initial KCNQ2 F&R primers. These products were also gel
extracted before cloning into the pDEST™32 bait vector via
the TOPO® system (as described above). Mutant baits were
sequence verified.

15   The interaction between each DB-Q2C mutant and CaM
was then tested by the yeast two-hybrid assay and compared
to the interaction with DB-Q2 wt. Three different PCR-
amplified CaM positive clones from the initial screen were
re-introduced by gap-repair[20] into the prey vector (pPC86)
20   in the yeast strain expressing either DB-Q2C wt, DB-Q2C
mutants or the empty DBLeu vector, used as negative
control.

         CaM interaction with the DB-Q2C wt and mutants was
then assessed by expression of the *HIS3* and *LacZ* reporter
25   genes.

         The Q2C R353G mutant did not interact with CaM, as
seen by no growth on *HIS3* selective plate (Figure 4C) and
no blue readout in the *LacZ* filter assay (seen as dark
squares in Figure 4D-F). On the other hand, the DB-Q2C
30   L619R mutant was shown to still interact with CaM, as seen
by growth on *HIS3* selective plate (Figure 4C) and the blue
readout in the *LacZ* filter assay. Interestingly, the DB-
Q2C L619R mutant showed an even greater growth level on
HIS3 selective plate than the DB-Q2C wt and also appeared
35   to stain faster and more intensely blue in the *LacZ* filter
assay, suggesting a stronger interaction between CaM and
this mutant.

In order to better quantify β-gal activity, a second assay was carried out using the high sensitivity substrate Chlorophenol Red-β-D-Galactopyranoside (CPRG) in liquid culture. The affinity of the DB-Q2C/AD-CaM interaction was measured in terms of units of β-gal activity, with a zero value indicating no expression of the *LacZ* reporter gene, and hence no interaction.

In the CPRG assay, a value of 0.05 units β-gal activity (Figure 5) was significantly different from the empty bait vector replicate (P<0.01, Student's *t* test), confirming the interaction of the DB-Q2C wt with CaM.

As observed in the *LacZ* filter assay, the CPRG assay showed a significant difference in the interaction between the Q2C R353G mutant and CaM as compared to the wt replicate (P<0.01, Student's *t* test, Figure 4).

These results suggest that the R353G mutation alters the structural conformation of the KCNQ2 C-terminal domain such that it is no longer able to bind to CaM and that this single point mutation is sufficient to abolish the interaction. By abolishing CaM binding, the R353G mutation could lead to an impairment of M-current *in vivo* due to decreased opening of the channel.

In contrast, the CPRG assay for the L619R Q2C mutant showed a significantly higher level of β-gal activity units (0.26 units) than the wt replicate (P<0.001, Student's *t* test, Figure 5). This finding indicates that the L619R mutation alters the conformation of the protein in a manner that increases CaM binding affinity for the KCNQ2 C-terminal domain by approximately 5-fold. The increased affinity for CaM may affect the ability of the complex to change conformation normally in response to calcium signalling. Alternatively, the marked increase in binding of CaM to the KCNQ2 L619R mutant channel may be detrimental to the M-channel function via disruption of the normal neuronal inhibitory/excitatory balance, therefore causing the seizures associated with epilepsy, particularly BFNS. CaM is known to be involved in both the

excitatory and inhibitory neurotransmission pathways (Ohya
and Botstein, 1994) and it has been proposed that the
temporal and spatial restrictions on CaM itself could
enable the tight control of these opposing reactions
5   (Toutenhoofd and Strehler, 2000). Hence, the KCNQ2 L619R
mutation could lead to a disruption of the local CaM pool
consequently disturbing the finely balanced excitatory and
inhibitory neurotransmission systems.

These results implicate CaM in the pathogenesis of
10   epilepsy and specifically in the BFNS syndrome. Whilst
further work will be required to fully elucidate the
involvement of the KCNQ2-CaM interaction in neuronal
excitability and its correlation with idiopathic epilepsy,
these data suggest that dysfunction of this interaction
15   leads to aberrant neuronal excitability in some BFNS
patients.
The calmodulin gene (and other ion channel interacting
genes) may therefore be a target for mutation in epilepsy
as well as other disorders associated with ion channel
20   dysfunction. A mutation in an ion channel interacting gene
when expressed alone, or when expressed in combination
with one or more other ion channel mutations or ion
channel interacting gene mutations (based on the digenic
model), may give rise to the disorder. The nature of the
25   ion channel interacting genes and proteins can be studied
such that these partners can also be targets for drug
discovery.

Industrial Applicability
30   The mutant ion channel receptor subunits of the
invention are useful in the diagnosis and treatment of
diseases such as epilepsy and disorders associated with
ion channel dysfunction including, but not limited to,
hyper- or hypo-kalemic periodic paralysis, myotonias,
35   malignant hyperthermia, myasthenia, cardiac arrhythmias,
episodic ataxia, migraine, Alzheimer's disease,
Parkinson's disease, schizophrenia, hyperekplexia,

anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness.

TABLE 1

Examples of mutations and variations identified in ion channel subunit genes

Subunit Gene	Exon/Intron	DNA Mutation	Amino Acid Change	SEQ ID NOS
Sodium Channel Subunits				
Coding exonic variants – amino acid change				
SCN1A[r]	Exon 5	c664C→T	R222X	1, 73
SCN1A[r]	Exon 8	c1152G→A	W384X	2, 74
SCN1A[r]	Exon 9	c1183G→C	A395P	3, 75
SCN1A[r]	Exon 9	c1207T→C	F403L	4, 76
SCN1A[r]	Exon 9	c1237T→A	Y413N	5, 77
SCN1A[r]	Exon 9	c1265T→A	V422E	6, 78
SCN1A[r]	Exon 21	c4219C→T	R1407X	7, 79
SCN1A[r]	Exon 26	c5339T→C	M1780T	8, 80
SCN1A[r]	Exon 26	c5674C→T	R1892X	9, 81
SCN1B[r]	Exon 3	c254G→A	R85H	10, 82
SCN2A[r]	Exon 6A	c668G→A	R223Q	11, 83
SCN2A[r]	Exon 16	c2674G→A	V892I	12, 84
SCN2A[r]	Exon 17	c3007C→A	L1003I	13, 85
SCN2A[r]	Exon 19	c3598A→G	T1200A	14, 86
SCN2A[r]	Exon 20	c3956G→A	R1319Q	15, 87
Coding exonic variants – no amino acid change				
SCN2A[c]	Exon 12	c1785T→C	-	16
SCN2A[c]	Exon 27	c4919T→A	-	17
Non-coding variants				
SCN1A[r]	Intron 9	IVS9-1G→A	-	18
SCN1A[c]	Intron 23	IVS23+33G→A	-	19
SCN2A[r]	Intron 7	IVS7+61T→A	-	20
SCN2A[r]	Intron 19	IVS19-55A→G	-	21
SCN2A[r]	Intron 22	IVS22-31A→G	-	22
SCN2A[c]	Intron 2	IVS2-28G→A	-	23
SCN2A[c]	Intron 8	IVS8-3T→C	-	24
SCN2A[c]	Intron 11	IVS11+49A→G	-	25
SCN2A[c]	Intron 11	IVS11-16C→T	-	26
SCN2A[c]	Intron 17	IVS17-71C→T	-	27
SCN2A[c]	Intron 17	IVS17-74delG	-	28
SCN2A[c]	Intron 17	IVS17-74insG	-	29
Nicotinic Acetylcholine Receptor Subunits				
Coding exonic variants – amino acid change				
CHRNA5[r]	Exon 4	c400G→A	V134I	30, 88
CHRNA2[c]	Exon 4	c373G→A	A125T	31, 89
CHRNA3[c]	Exon 2	c110G→A	R37H	32, 90
Coding variants – no amino acid change				
CHRNA2[c]	Exon 4	c351C→T	-	33
CHRNA2[c]	Exon 5	c771C→T	-	34
CHRNA3[c]	Exon 2	c159A→G	-	35
CHRNA3[c]	Exon 4	c291G→A	-	36
CHRNA3[c]	Exon 4	c345G→A	-	37

TABLE 1 (Continued)

Examples of mutations and variations identified in ion channel subunit genes

Subunit Gene	Exon/Intron	DNA Mutation	Amino Acid Change	SEQ ID NOS
Non-coding variants				
CHRNA2[c]	Intron 3	IVS3-16C→T	-	38
CHRNA3[c]	Intron 3	IVS3-5T→C	-	39
CHRNA3[c]	Intron 4	IVS4+8G→C	-	40
Potassium Channel Subunits				
Coding exonic variants – amino acid change				
KCNQ2[r]	Exon 1	c204-c205insC	K69fsX119	41, 91
KCNQ2[r]	Exon 1	c1A→G	M1V	42
KCNQ2[r]	Exon 1	c2T→C	M1T	43
KCNQ2[r]	Exon 8	c1057C→G	R353G	44, 92
KCNQ2[r]	Exon 11	c1288C→T	R430X	45, 93
KCNQ2[r]	Exon 14	c1710A→T	R570S	46, 94
KCNQ2[r]	Exon 15	c1856T→G	L619R	47, 95
Non-coding variants				
KCNQ2[r]	Intron 9	IVS9+(46-48)delCCT	-	48
KCNQ3[r]	Intron 11	IVS11+43G→A	-	49
KCNQ3[c]	Intron 12	IVS12+29G→A	-	50
GABA Receptor Subunits				
Coding exonic variants – no amino acid change				
GABRB1[r]	Exon 5	c508C→T	-	51
GABRB1[r]	Exon 9	c1329G→A	-	52
GABRB1[c]	Exon 8	c975C→T	-	53
GABRG3[c]	Exon 8	c995T→C	-	54
Non-coding variants				
GABRA1[c]	5' UTR	c-142A→G	-	55
GABRA1[c]	5' UTR	c-31C→T	-	56
GABRA2[c]	3' UTR	c1615G→A	-	57
GABRA5[c]	5' UTR	c-271G→C	-	58
GABRA5[c]	5' UTR	c-228A→G	-	59
GABRA5[c]	5' UTR	c-149G→C	-	60
GABRB2[b]	5' UTR	c-159C→T	-	61
GABRB2[c]	3' UTR	c1749C→T	-	62
GABRPi[c]	5' UTR	c-101C→T	-	63
GABRB1[c]	Intron 1	IVS1+24T→G	-	64
GABRB1[c]	Intron 5	IVS6+72T→G	-	65
GABRB1[c]	Intron 7	IVS7-34A→G	-	66
GABRB3[r]	Intron 1	IVS1-14C→T	-	67
GABRB3[r]	Intron 7	IVS7+58delAA	-	68
GABRD[r]	Intron 6	IVS6+132insC	-	69
GABRD[r]	Intron 6	IVS6+130insC	-	70
GABRD[r]	Intron 6	IVS6+73del CGCGCCCACCGCCCCTTCCGCG	-	71
GABRG3[c]	Intron 8	IVS8-102C→T	-	72

Note: [r] Mutations or variations only occurring in individuals with epilepsy; [b] Variant seen only in normal control samples; [c] Mutations or variants seen in individuals with epilepsy as well as normal control samples. The KCNQ2 numbering is based on the large isoform (inclusion of exon 10a). The numbering of exons and introns for SCN2A is based on the publication of Kasai et al. 2001.

References

References cited herein are listed on the following pages, and are incorporated herein by this reference.

5   Andermann, E. (1982). *In: Genetic basis of the epilepsies.*
        Anderson, VE. Hauser, WA. Penry, JK. and Singh, CF.
        (Editors). New York, Raven Press. 355-374.
     Annegers, JF. (1996). *The treatment of epilepsy:*
        Principles and practice. Second Edition. (Wyllie E
10   (Ed) Williams and Wilkins).
     Bell, JI. and Lathrop, M. (1996). *Nature Genet.* 13: 377-
        378.
     Berkovic, SF. Andermann, F. Andermann, E. and Gloor, P.
        (1987). *Neurology* 37: 993-1000.
15   Berkovic, SF. Reutens, DC. Andermann, E. and Andermann, F.
        (1994). *In: Epileptic seizures and syndromes.* Wolf,
        P. (Editor). London: John Libbey. 25-37.
     Berkovic, SF. Mazarib, A. Neufeld, M. et al. (2000).
        Neurology (Supplement 3). 54: A356.
20   Biervert, C. Schroeder, BC. Kubisch, C. Berkovic, SF.
        Propping, P. Jentsch, TJ. and Steinlein, OK. (1998).
        Science 279: 403-406.
     Breaker, RR. and Joyce, GF. (1995). *Chem. Biol.*
        2: 655-600.
25   Cavazzuti, GB. Capella, L. and Nalin, A. (1980). *Epilepsia*
        21: 43-55.
     Charlier, C. Singh, NA. Ryan, SG. Lewis, TB. Reus, BE.
        Leach, RJ. and Leppert, M. (1998). *Nature Genet.* 18:
        53-55.
30   Cole, SP. Campling, BG. Atlaw, T. Kozbor, D. and Roder,
        JC. (1984). *Mol. Cell Biochem.* 62: 109-120.
     Collins, FS. (1995). *Nature Genet.* 9: 347-350.
     Commission on Classification and Terminology of the
        International League against Epilepsy. (1989).
35   *Epilepsia* 30: 389-399.

Cote, RJ. Morrissey, DM. Houghton, AN. Beattie, EJ Jr.
     Oettgen, HF. and Old, LJ. (1983). *Proc. Natl. Acad.
     Sci. USA* 80: 2026-2030.

Doose, H. and Baier, WK. (1987). *Neuropediatrics* 18
5   (Supplement 1): 1-64.

Doose, H. and Baier, W. (1989). *Clev. Clin. J. Med.* 56
     (Supplement): s105-s110.

Dworakowska, B. and Dolowy, K. (2000). *Acta Biochim. Pol.*
     47: 685-703.

10 Escayg, A. MacDonald, BT. Meisler, MH. Baulac, S.
     Huberfeld, G. An-Gourfinkel, I. Brice, A. LeGuern, E.
     Moulard, B. Chaigne, D. Buresi, C. and Malafosse, A.
     (2000). *Nature Genet.* 24: 343-345.

Fong, GC. Shah, PU. Gee, MN. Serratosa, JM. Castroviejo,
15   IP. Khan, S. Ravat, SH. Mani, J. Huang, Y. Zhao, HZ.
     Medina, MT. Treiman, LJ. Pineda, G. and Delgado-
     Escueta, AV. (1998). *Am. J. Hum. Genet.* 63: 1117-1129.

Gamper, N. and Shapiro, MS. (2003). *J. Gen. Physiol.* 122:
     17-31.

20 Gardiner, M. (2000). *J Neurol.* 247: 327-334.

Goldman, CK. Soroceanu, L. Smith, N. Gillespie, GY. Shaw,
     W. Burgess, S. Bilbao, G. and Curiel, DT. (1997). *Nature
     Biotechnology* 15: 462-466.

Gonzalez, JE. *et al.* (1999). *Drug Discov. Today* 4: 431-
25   439.

Greenberg, DA. Delagado-Escueta, AV. Maldonado, HM. and
     Widellitz, H. (1988a). *Genet Epidem.* 5: 81-94.

Greenberg, DA. Delgado-Escueta, AV. Widelitz, H. Sparkes,
     RS. Treiman, L. Maldonado, HM. Park, MS. and Terasaki,
30   PI. (1988b). *Am. J. Med. Genet.* 31: 185-192.

Greenberg, DA. Durner, M. and Delgado-Escueta, AV. (1992).
     Neurology 42 (Suppl 5): 56-62.

Hamill, OP. *et al.* (1981). *Pflugers Arch.* 391: 85-100.

Haseloff, J. and Gerlach, WL. (1988). *Nature* 334: 585-591.

35 Hauser, WA. Annegers, JF. and Kurland, LT. (1993).
     Epilepsia 34: 453-468.

Heller, RA. Schena, M. Chai, A. Shalon, D. Bedilion, T. Gilmore, J. Woolley, DE. and Davis RW. (1997). *Proc. Natl. Acad. Sci. USA* 94: 2150-2155.

Huse, WD. Sastry, L. Iverson, SA. Kang, AS. Alting-Mees, M. Burton, DR. Benkovic, SJ. and Lerner, RA. (1989). *Science* 246: 1275-1281.

Italian League Against Epilepsy Genetic Collaborative Group. (1993). *Epilepsia* 34: 819-26.

Janz, D. Beck-Mannagetta, G. and Sander, T. (1992). *Neurology* 42 (Suppl 5): 48-55.

Jentsch, TJ. (2000). *Nature Rev. Neurosci.* 1: 21-29.

Kasai, N. Fukushima, K. Ueki, Y. Prasad, S. Nosakowski, J. Sugata, K. Sugata, A. Nishizaki, K. Meyer, NC. and Smith, RJ. (2001). *Gene* 264: 113-122.

Kohler, G. and Milstein, C. (1975). *Nature* 256: 495-497.

Kozbor, D. Abramow-Newerly, W. Tripputi, P. Cole, SP. Weibel, J. Roder, JC. and Croce, CM. (1985). *J. Immunol. Methods* 81:31-42.

Lernmark, A. and Ott, J. (1998). *Nature Genet.* 19: 213-214.

Ohya, Y. and Botstein, D. (1994). *Science* 263: 963-966.

Okubo, Y. Matsuura, M. Asai, T. Asai, K. Kato, M. Kojima, T. and Toru, M. (1994). *Epilepsia* 35: 832-841.

Orlandi, R. Gussow, DH. Jones, PT. and Winter, G. (1989). *Proc. Natl. Acad. Sci. USA* 86: 3833-3837.

Palfi, A. Kortvely, E. Fekete, E. Kovacs, B. Varszegi, S. and Gulya, K. (2002). *Life Sciences* 70: 2829-2855.

Panayiotopoulos, CP. and Obeid, T. (1989). *Ann. Neurol.* 25: 440-443.

Phillips, HA. Favre, I. Kirkpatrick, M. Zuberi, SM. Goudie, D. Heron, SE. Scheffer, IE. Sutherland, GR. Berkovic, SF. Bertrand, D. and Mulley, JC. (2001). *Am. J. Hum. Genet.* 68: 225-231.

Reutens, DC. and Berkovic, SF. (1995). *Neurology* 45: 1469-1476.

Rickert, RC. Roes, J. and Rajewsky, K. (1997). *Nucleic Acids Res.* 25: 1317-1318.

Risch, N. and Botstein, D. (1996). *Nature Genet.* 12: 351-
    353.

Roger, J. Bureau, M. Dravet, C. Dreifuss, FE. Perret, A.
    and Wolf, P. (1992). *Epileptic syndromes in infancy,*
    childhood and adolescence. 2nd Edition. London, John
    Libbey.

Scharf, KD. Materna, T. Treuter, E. and Nover, L. (1994).
    Results Probl. Cell Differ. 20: 125-162.

Scheffer, IE. and Berkovic, SF. (1997). *Brain* 120: 479-90.

Schena, M. Shalon, D. Heller, R. Chai, A. Brown, PO. and
    Davis, RW. (1996). *Proc. Natl. Acad. Sci. USA* 93: 10614-
    10619.

Schmitt, N. Schwarz, M. Peretz, A. Abitbol, I. Attali, B.
    and Pongs, O. (2000). *Embo J.* 19: 332-340.

Schwake, M. Pusch, M. Kharkovets, T. and Jentsch, TJ.
    (2000). *J. Biol. Chem.* 275: 13343-13348.

Schwenk, F. Baron, U. and Rajewsky, K. (1995). *Nucleic*
    Acids Res. 23: 5080-5081.

Singh, NA. Charlie, C. Stauffer, D. DuPont, BR. Leach, RJ.
    Melis, R. Ronen, GM. Bjerre, I. Quattlebaum, T.
    Murphy, JV. McHarg, ML. Gagnon, D. Rosales, TO.
    Peiffer, A. Anderson, VE. and Leppert, M. (1998).
    Nature Genet. 18: 25-29.

Singh, R. Scheffer, IE. Crossland, K. and Berkovic, SF.
    (1999). *Ann. Neurol.* 45: 75-81.

Steinlein, OK. Mulley, JC. Propping, P. Wallace, RH.
    Phillips, HA. Sutherland, GR. Scheffer, IE. and
    Berkovic, SF. (1995). *Nature Genet.* 11: 201-203.

Todd, JA. (1999). *Lancet* 354 (Supplement 1): 15-16.

Toutenhoofd, SL. and Strehler, EE. (2000). *Cell Calcium*
    28: 83-96.

Wallace, RH. Marini, C. Petrou, S. Harkin, LA. Bowser, DN.
    Panchal, RG. Williams, DA. Sutherland, GR. Mulley, JC.
    Scheffer, IE. and Berkovic, SF. (2001a). *Nature Genet.*
    28: 49-52.

Wallace, RH. Scheffer, IE. Barnett, S. Richards, M.
    Dibbens, L. Desai, RR. Lerman-Sagie, T. Lev, D.

Mazarib, A. Brand, N. Ben-Zeev, B. Goikhman, I. Singh, R. Kremmidiotis, G. Gardner, A. Sutherland, GR. George, AL Jr. Mulley, JC. and Berkovic, SF. (2001*b*). *Am. J. Hum. Genet.* 68: 859-865.

5   Wallace, RH. Wang, DW. Singh, R. Scheffer, I. George, A. Phillips, H. Saar, K. Reis, A. Johnson, E. Sutherland, G. Berkovic, S. and Mulley, J. (1998). *Nature Genet.* 19: 366-370.

Wen, H. and Levitan, IB. (2002). *J. Neurosci.* 22: 7991-
10   8001.

Winter, G. and Milstein, C. (1991). *Nature* 349: 293-299.

Wyman, AR. and White, R. (1980). *Proc. Natl. Acad. Sci.* 77: 6754-6758.

Yus-Najera, E. Santana-Castro, I. and Villarroel, A.
15   (2002). *J. Biol. Chem.* 277: 28545-28553.

Zara, F. Bianchi, A. Avanzini, G. Di Donato, S. Castellotti, B. Patel, PI. and Pandolfo, M. (1995). *Hum. Mol. Genet.* 4: 1201-1207.

Zara, F. Gennaro, E. Stabile, M. Carbone, I. Malacarne, M.
20   Majello, L. Santangelo, R. de Falco, FA. and Bricarelli, FD. (2000). *Am. J. Hum. Genet.* 66: 1552-1557.

Claims

1.   A method of identifying a subject predisposed to a
disorder   associated   with   ion   channel   dysfunction,
comprising ascertaining whether at least one of the genes
encoding   ion   channel   subunits   in   said   subject   has
undergone   a   mutation   event   selected   from   the   group
consisting   of   the   mutation   events   set   forth   in   the
following Table:

Subunit Gene	Exon/Intron	DNA Mutation
SCN1A	Exon 5	c664C→T
SCN1A	Exon 8	c1152G→A
SCN1A	Exon 9	c1183G→C
SCN1A	Exon 9	c1207T→C
SCN1A	Exon 9	c1237T→A
SCN1A	Exon 9	c1265T→A
SCN1A	Exon 21	c4219C→T
SCN1A	Exon 26	c5339T→C
SCN1A	Exon 26	c5674C→T
SCN1B	Exon 3	c254G→A
SCN2A	Exon 6A	c668G→A
SCN2A	Exon 16	c2674G→A
SCN2A	Exon 17	c3007C→A
SCN2A	Exon 19	c3598A→G
SCN2A	Exon 20	c3956G→A
SCN2A	Exon 12	c1785T→C
SCN2A	Exon 27	c4919T→A
SCN1A	Intron 9	IVS9-1G→A
SCN1A	Intron 23	IVS23+33G→A
SCN2A	Intron 7	IVS7+61T→A
SCN2A	Intron 19	IVS19-55A→G
SCN2A	Intron 22	IVS22-31A→G
SCN2A	Intron 2	IVS2-28G→A
SCN2A	Intron 8	IVS8-3T→C
SCN2A	Intron 11	IVS11+49A→G
SCN2A	Intron 11	IVS11-16C→T
SCN2A	Intron 17	IVS17-71C→T
SCN2A	Intron 17	IVS17-74delG
SCN2A	Intron 17	IVS17-74insG
CHRNA5	Exon 4	c400G→A
CHRNA2	Exon 4	c373G→A
CHRNA3	Exon 2	c110G→A
CHRNA2	Exon 4	c351C→T

CHRNA2	Exon 5	c771C→T
CHRNA3	Exon 2	c159A→G
CHRNA3	Exon 4	c291G→A
CHRNA3	Exon 4	c345G→A
CHRNA2	Intron 3	IVS3-16C→T
CHRNA3	Intron 3	IVS3-5T→C
CHRNA3	Intron 4	IVS4+8G→C
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KCNQ2	Exon 1	c1A→G
KCNQ2	Exon 1	c2T→C
KCNQ2	Exon 8	c1057C→G
KCNQ2	Exon 11	c1288C→T
KCNQ2	Exon 14	c1710A→T
KCNQ2	Exon 15	c1856T→G
KCNQ2	Intron 9	IVS9+(46-48)delCCT
KCNQ3	Intron 11	IVS11+43G→A
KCNQ3	Intron 12	IVS12+29G→A
GABRB1	Exon 5	c508C→T
GABRB1	Exon 9	c1329G→A
GABRB1	Exon 8	c975C→T
GABRG3	Exon 8	c995T→C
GABRA1	5' UTR	c-142A→G
GABRA1	5' UTR	c-31C→T
GABRA2	3' UTR	c1615G→A
GABRA5	5' UTR	c-271G→C
GABRA5	5' UTR	c-228A→G
GABRA5	5' UTR	c-149G→C
GABRB2	5' UTR	c-159C→T
GABRB2	3' UTR	c1749C→T
GABRPi	5' UTR	c-101C→T
GABRB1	Intron 1	IVS1+24T→G
GABRB1	Intron 6	IVS6+72T→G
GABRB1	Intron 7	IVS7-34A→G
GABRB3	Intron 1	IVS1-14C→T
GABRB3	Intron 7	IVS7+58delAA
GABRD	Intron 6	IVS6+132insC
GABRD	Intron 6	IVS6+130insC
GABRD	Intron 6	IVS6+73delCGCGCCCACCGCCCCTTCCGCG
GABRG3	Intron 8	IVS8-102C→T

2.   A method as claimed in claim 1 wherein a cDNA derived from said subject comprises the sequence set forth in one of SEQ ID NOS: 1-72.

5

3.   A method as claimed in claim 1 wherein a cDNA derived from said subject has the sequence set forth in one of SEQ ID NOS: 1-72.

5   4.   A method as claimed in any one of claims 1 to 3, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce an epilepsy phenotype in said subject.

10   5.   A method as claimed in any one of claims 1 to 3, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce one or more disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic
15   periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain,
20   chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness in said subject.

25   6.   A method as claimed in any one of claims 1 to 3, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce an epilepsy phenotype when expressed in combination with one or more additional mutations or variations in said ion channel
30   subunit genes.

7.   A method as claimed in any one of claims 1 to 3, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce one or more
35   disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia,

myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain,

5   chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness, when expressed in combination with one or more additional mutations or

10   variations in said ion channel subunit genes.

8.   An isolated nucleic acid molecule encoding a mutant or variant ion channel subunit wherein a mutation event selected from the group consisting of the mutation events

15   set forth in the following Table:

Subunit Gene	Exon/Intron	DNA Mutation
SCN1A	Exon 5	c664C→T
SCN1A	Exon 8	c1152G→A
SCN1A	Exon 9	c1183G→C
SCN1A	Exon 9	c1207T→C
SCN1A	Exon 9	c1237T→A
SCN1A	Exon 9	c1265T→A
SCN1A	Exon 21	c4219C→T
SCN1A	Exon 26	c5339T→C
SCN1A	Exon 26	c5674C→T
SCN1B	Exon 3	c254G→A
SCN2A	Exon 6A	c668G→A
SCN2A	Exon 16	c2674G→A
SCN2A	Exon 17	c3007C→A
SCN2A	Exon 19	c3598A→G
SCN2A	Exon 20	c3956G→A
SCN2A	Exon 12	c1785T→C
SCN2A	Exon 27	c4919T→A
SCN1A	Intron 9	IVS9-1G→A
SCN1A	Intron 23	IVS23+33G→A
SCN2A	Intron 7	IVS7+61T→A
SCN2A	Intron 19	IVS19-55A→G
SCN2A	Intron 22	IVS22-31A→G
SCN2A	Intron 2	IVS2-28G→A
SCN2A	Intron 8	IVS8-3T→C
SCN2A	Intron 11	IVS11+49A→G
SCN2A	Intron 11	IVS11-16C→T

SCN2A	Intron 17	IVS17-71C→T
SCN2A	Intron 17	IVS17-74delG
SCN2A	Intron 17	IVS17-74insG
CHRNA5	Exon 4	c400G→A
CHRNA2	Exon 4	c373G→A
CHRNA3	Exon 2	c110G→A
CHRNA2	Exon 4	c351C→T
CHRNA2	Exon 5	c771C→T
CHRNA3	Exon 2	c159A→G
CHRNA3	Exon 4	c291G→A
CHRNA3	Exon 4	c345G→A
CHRNA2	Intron 3	IVS3-16C→T
CHRNA3	Intron 3	IVS3-5T→C
CHRNA3	Intron 4	IVS4+8G→C
KCNQ2	Exon 1	c204-c205insC
KCNQ2	Exon 1	c1A→G
KCNQ2	Exon 1	c2T→C
KCNQ2	Exon 8	c1057C→G
KCNQ2	Exon 11	c1288C→T
KCNQ2	Exon 14	c1710A→T
KCNQ2	Exon 15	c1856T→G
KCNQ2	Intron 9	IVS9+(46-48)delCCT
KCNQ3	Intron 11	IVS11+43G→A
KCNQ3	Intron 12	IVS12+29G→A
GABRB1	Exon 5	c508C→T
GABRB1	Exon 9	c1329G→A
GABRB1	Exon 8	c975C→T
GABRG3	Exon 8	c995T→C
GABRA1	5' UTR	c-142A→G
GABRA1	5' UTR	c-31C→T
GABRA2	3' UTR	c1615G→A
GABRA5	5' UTR	c-271G→C
GABRA5	5' UTR	c-228A→G
GABRA5	5' UTR	c-149G→C
GABRB2	5' UTR	c-159C→T
GABRB2	3' UTR	c1749C→T
GABRPi	5' UTR	c-101C→T
GABRB1	Intron 1	IVS1+24T→G
GABRB1	Intron 6	IVS6+72T→G
GABRB1	Intron 7	IVS7-34A→G
GABRB3	Intron 1	IVS1-14C→T
GABRB3	Intron 7	IVS7+58delAA
GABRD	Intron 6	IVS6+132insC
GABRD	Intron 6	IVS6+130insC
GABRD	Intron 6	IVS6+73delCGCGCCCACCGCCCCTTCCGCG
GABRG3	Intron 8	IVS8-102C→T

has occurred.

9.   An isolated nucleic acid molecule encoding a mutant
or variant ion channel subunit as claimed in claim 8
5   wherein a cDNA derived therefrom comprises the sequence
set forth in one of SEQ ID NOS: 1-72.

10.   An isolated nucleic acid molecule encoding a mutant
or variant ion channel subunit as claimed in claim 8
10   wherein a cDNA derived therefrom has the sequence set
forth in one of SEQ ID NOS: 1-72.

11.   An isolated nucleic acid molecule encoding a mutant
or variant ion channel subunit as claimed in any one of
15   claims 8 to 10, wherein said mutation event disrupts the
functioning of an assembled ion channel so as to produce
an epilepsy phenotype.

12.   An isolated nucleic acid molecule encoding a mutant
20   or variant ion channel subunit as claimed in any one of
claims 8 to 10, wherein said mutation event disrupts the
functioning of an assembled ion channel so as to produce
one or more disorders associated with ion channel
dysfunction, including but not restricted to, hyper- or
25   hypo-kalemic periodic paralysis, myotonias, malignant
hyperthermia, myasthenia, cardiac arrhythmias, episodic
ataxia, migraine, Alzheimer's disease, Parkinson's
disease, schizophrenia, hyperekplexia, anxiety,
depression, phobic obsessive symptoms, neuropathic pain,
30   inflammatory pain, chronic/acute pain, Bartter's syndrome,
polycystic kidney disease, Dent's disease,
hyperinsulinemic hypoglycemia of infancy, cystic fibrosis,
congenital stationary night blindness and total colour-
blindness.

35

13.   An isolated nucleic acid molecule encoding a mutant
or variant ion channel subunit as claimed in any one of

claims 8 to 10, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce an epilepsy phenotype when expressed in combination with one or more additional mutations or variations in said ion channel subunit genes.

14. An isolated nucleic acid molecule encoding a mutant or variant ion channel subunit as claimed in any one of claims 8 to 10, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce one or more disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness, when expressed in combination with one or more additional mutations or variations in said ion channel subunit genes.

15. An isolated nucleic acid molecule comprising any one of the nucleotide sequences set forth in SEQ ID NOS: 1-72.

16. An isolated nucleic acid molecule consisting of any one of the nucleotide sequences set forth in SEQ ID NOS: 1-72.

17. An isolated nucleic acid molecule encoding a mutant KCNQ2 subunit, wherein the mutation event has occurred in the C-terminal domain of the KCNQ2 subunit and leads to a disturbance in the calmodulin binding affinity of the subunit, so as to produce an epilepsy phenotype.

18.   An isolated nucleic acid molecule as claimed in claim
17 wherein the mutation event has occurred in exon 8, exon
11, exon 14 or exon 15.

19.   An isolated polypeptide, said polypeptide being a
mutant or variant ion channel subunit wherein a mutation
event selected from the group consisting of the mutation
events set forth in the following Table:

Subunit Gene	Amino Acid Change
SCN1A	R222X
SCN1A	W384X
SCN1A	A395P
SCN1A	F403L
SCN1A	Y413N
SCN1A	V422E
SCN1A	R1407X
SCN1A	M1780T
SCN1A	R1892X
SCN1B	R85H
SCN2A	R223Q
SCN2A	V892I
SCN2A	L1003I
SCN2A	T1200A
SCN2A	R1319Q
CHRNA5	V134I
CHRNA2	A125T
CHRNA3	R37H
KCNQ2	K69fsX119
KCNQ2	M1V
KCNQ2	M1T
KCNQ2	R353G
KCNQ2	R430X
KCNQ2	R570S
KCNQ2	L619R

has occurred.

20.   An isolated polypeptide, said polypeptide being a
mutant or variant ion channel subunit as claimed in claim
19 wherein the polypeptide comprises the amino acid
sequence set forth in one of SEQ ID NOS: 73-95.

21.   An isolated polypeptide, said polypeptide being a
mutant or variant ion channel subunit as claimed in claim

19 wherein the polypeptide has the amino acid sequence set forth in one of SEQ ID NOS: 73-95.

5   22. An isolated polypeptide, said polypeptide being a mutant or variant ion channel subunit as claimed in any one of claims 19 to 21, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce an epilepsy phenotype.

10   23. An isolated polypeptide, said polypeptide being a mutant or variant ion channel subunit as claimed in any one of claims 19 to 21, wherein said mutation event disrupts the functioning of an assembled ion channel so as to produce one or more disorders associated with ion
15   channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia,
20   anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total
25   colour-blindness.

24. An isolated polypeptide, said polypeptide being a mutant or variant ion channel subunit as claimed in any one of claims 19 to 21, wherein said mutation event
30   disrupts the functioning of an assembled ion channel so as to produce an epilepsy phenotype when expressed in combination with one or more additional mutations or variations in said ion channel subunit genes.

35   25. An isolated polypeptide, said polypeptide being a mutant or variant ion channel subunit as claimed in any one of claims 19 to 21, wherein said mutation event

disrupts the functioning of an assembled ion channel so as to produce one or more disorders associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias,
5   malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain,
10   Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness and total colour-blindness, when expressed in combination with one or more additional mutations or variations in said ion
15   channel subunit genes.

26. An isolated polypeptide comprising any one of the amino acid sequences set forth in SEQ ID NOS: 73-95.

20   27. An isolated polypeptide consisting of any one of the amino acid sequences set forth in SEQ ID NOS: 73-95.

28. An isolated polypeptide, said polypeptide being a mutant KCNQ2 subunit, wherein the mutation event has
25   occurred in the C-terminal domain of the KCNQ2 subunit and leads to a disturbance in the calmodulin binding affinity of the subunit, so as to produce an epilepsy phenotype.

29. An isolated polypeptide complex, said polypeptide
30   complex being an assembled mammalian ion channel including an ion channel subunit comprising a polypeptide as defined in any one of claims 19 to 28.

30. An expression vector comprising a nucleic acid
35   molecule as claimed in any one of claims 8 to 18.

31.   A cell comprising at least one expression vector as
claimed in claim 30.

32.   A cell as claimed in claim 31 comprising two or more
expression vectors.

33.   A cell comprising at least one ion channel type,
wherein the or each ion channel type incorporates at least
one mutant polypeptide as claimed in any one claims 19 to
28.

34.   A cell as claimed in claim 33 comprising ion channels
that incorporate two or more mutant polypeptides.

35.   A cell as claimed in claim 33 comprising two or more
ion channel types each incorporating one or more mutant
polypeptides.

36.   A method of preparing a polypeptide, comprising the
steps of:
        (1)   culturing cells as claimed in any one of claims
              31 to 35 under conditions effective for
              polypeptide production; and
        (2)   harvesting the polypeptide.

37.   A polypeptide prepared by the method of claim 36.

38.   An antibody which is immunologically reactive with an
isolated polypeptide as claimed in any one of claims 19 to
28 or claim 37, or an isolated polypeptide complex as
claimed in claim 29.

39.   An antibody as claimed in claim 38 which is selected
from the group consisting of a monoclonal antibody, a
humanised antibody, a chimeric antibody or an antibody
fragment including a Fab fragment, (Fab')2 fragment, Fv

fragment, single chain antibodies and single domain antibodies.

40. A method of treating epilepsy comprising administering an antibody as claimed in either one of claims 38 or 39 to a subject in need of such treatment.

41. The use of an antibody, as claimed in either one of claims 38 or 39, in the manufacture of a medicament for the treatment of epilepsy.

42. A method of treating a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, comprising administering an antibody as claimed in either one of claims 38 or 39 to a subject in need of such treatment.

43. The use of an antibody, as claimed in either one of claims 38 or 39, in the manufacture of a medicament for the treatment of a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease,

hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.

5   44. A method of treating epilepsy comprising administering a selective agonist, antagonist or modulator of an ion channel when it has undergone a mutation event or combination of events as defined in any one of claims 19 to 28 to a subject in need of such treatment.

10

45. The use of a selective agonist, antagonist or modulator of an ion channel when it has undergone a mutation event as defined in any one of claims 19 to 28 in the manufacture of a medicament for the treatment of

15   epilepsy.

46. A method of treating a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias,

20   malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain,

25   Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, comprising administering a selective agonist, antagonist or modulator of an ion channel when it

30   has undergone a mutation event or combination of events as defined in any one of claims 19 to 28 to a subject in need of such treatment.

47. The use of a selective agonist, antagonist or

35   modulator of an ion channel when it has undergone a mutation event as claimed in any one of claims 19 to 28 in the manufacture of a medicament for the treatment of a

disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.

48. A method of treating epilepsy comprising administering an isolated DNA molecule which is the complement (antisense) of a nucleic acid molecule as claimed in any one of claims 8 to 18 and which encodes an RNA molecule that hybridizes with the mRNA encoded by a nucleic acid molecule as claimed in any one of claims 8 to 18, to a subject in need of such treatment.

49. The use of a DNA molecule which is the complement of a nucleic acid molecule as claimed in any one of claims 8 to 18 and which encodes an RNA molecule that hybridizes with the mRNA encoded by a nucleic acid molecule as claimed in any one of claims 8 to 18, in the manufacture of a medicament for the treatment of epilepsy.

50. A method of treating a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic

fibrosis, congenital stationary night blindness or total
colour-blindness, comprising administering an isolated
DNA molecule which is the complement (antisense) of a
nucleic acid molecule as claimed in any one of claims 8 to
5   18 and which encodes an RNA molecule that hybridizes with
the mRNA encoded by a nucleic acid molecule as claimed in
any one of claims 8 to 18, to a subject in need of such
treatment.

10   51.   The use of a DNA molecule which is the complement of
a nucleic acid molecule as claimed in any one of claims 8
to 18 and which encodes an RNA molecule that hybridizes
with the mRNA encoded by a nucleic acid molecule as
claimed in any one of claims 8 to 18, in the manufacture
15   of a medicament for the treatment of a disorder associated
with ion channel dysfunction, including but not restricted
to, hyper- or hypo-kalemic periodic paralysis, myotonias,
malignant hyperthermia, myasthenia, cardiac arrhythmias,
episodic   ataxia,   migraine,   Alzheimer's   disease,
20   Parkinson's   disease,   schizophrenia,   hyperekplexia,
anxiety,   depression,   phobic   obsessive   symptoms,
neuropathic pain, inflammatory pain, chronic/acute pain,
Bartter's   syndrome,   polycystic   kidney   disease,   Dent's
disease, hyperinsulinemic hypoglycemia of infancy, cystic
25   fibrosis, congenital stationary night blindness or total
colour-blindness.

52.   A   method   of   treating   epilepsy   comprising
administering an antibody, as claimed in either one of
30   claims 38 or 39, administration of an agonist, antagonist
or modulator of an ion channel when it has undergone a
mutation event or combination of events as defined in any
one of claims 19 to 28, or administration of a DNA
molecule which is the complement of a nucleic acid
35   molecule as claimed in any one of claims 8 to 18 and which
encodes an RNA molecule that hybridizes with the mRNA
encoded by a nucleic acid molecule as claimed in any one

of claims 8 to 18, in combination with administration of
the wild-type ion channel subunit, to a subject in need of
such treatment.

5   53. The use of an antibody, as claimed in claims 38 or
39, use of an agonist, antagonist or modulator of an ion
channel when it has undergone a mutation event or
combination of events as defined in any one of claims 19
to 28, or use of a DNA molecule which is the complement of
10   a nucleic acid molecule as claimed in any one of claims 8
to 18 and which encodes an RNA molecule that hybridizes
with the mRNA encoded by a nucleic acid molecule as
claimed in any one of claims 8 to 18, in combination with
the use of the wild-type ion channel subunit, in the
15   manufacture of a medicament for the treatment of epilepsy.

54. A method of treating a disorder associated with ion
channel dysfunction, including but not restricted to,
hyper- or hypo-kalemic periodic paralysis, myotonias,
20   malignant hyperthermia, myasthenia, cardiac arrhythmias,
episodic   ataxia,   migraine,   Alzheimer's   disease,
Parkinson's   disease,   schizophrenia,   hyperekplexia,
anxiety,   depression,   phobic   obsessive   symptoms,
neuropathic pain, inflammatory pain, chronic/acute pain,
25   Bartter's   syndrome,   polycystic   kidney   disease,   Dent's
disease, hyperinsulinemic hypoglycemia of infancy, cystic
fibrosis, congenital stationary night blindness or total
colour-blindness,   comprising administering an antibody,
as   claimed   in   either   one   of   claims   38   or   39,
30   administration of an agonist, antagonist or modulator of
an ion channel when it has undergone a mutation event or
combination of events as defined in any one of claims 19
to 28, or administration of a DNA molecule which is the
complement of a nucleic acid molecule as claimed in any
35   one of claims 8 to 18 and which encodes an RNA molecule
that hybridizes with the mRNA encoded by a nucleic acid
molecule as claimed in any one of claims 8 to 18, in

combination with administration of the wild-type ion
channel subunit, to a subject in need of such treatment.

5   55. The use of an antibody, as claimed in claims 387 or
    39, use of an agonist, antagonist or modulator of an ion
    channel when it has undergone a mutation event or
    combination of events as defined in any one of claims 19
    to 28, or use of a DNA molecule which is the complement of
    a nucleic acid molecule as claimed in any one of claims 8
10 to 18 and which encodes an RNA molecule that hybridizes
    with the mRNA encoded by a nucleic acid molecule as
    claimed in any one of claims 8 to 18, in combination with
    the use of the wild-type ion channel subunit, in the
    manufacture of a medicament for the treatment of a
15 disorder associated with ion channel dysfunction,
    including but not restricted to, hyper- or hypo-kalemic
    periodic paralysis, myotonias, malignant hyperthermia,
    myasthenia, cardiac arrhythmias, episodic ataxia,
    migraine, Alzheimer's disease, Parkinson's disease,
20 schizophrenia, hyperekplexia, anxiety, depression, phobic
    obsessive symptoms, neuropathic pain, inflammatory pain,
    chronic/acute pain, Bartter's syndrome, polycystic kidney
    disease, Dent's disease, hyperinsulinemic hypoglycemia of
    infancy, cystic fibrosis, congenital stationary night
25 blindness or total colour-blindness.

    56. Use of a nucleic acid molecule as claimed in any one
    of claims 8 to 18 for the screening of candidate
    pharmaceutical agents.
30
    57. Use of a nucleic acid molecule as claimed in any one
    of claims 8 to 18 for the screening of candidate
    pharmaceutical agents useful for the treatment of
    epilepsy.
35
    58. Use of a nucleic acid molecule as claimed in any one
    of claims 8 to 18 for the screening of candidate

pharmaceutical agents useful for the treatment of a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.

59. Use of a polypeptide as claimed in any one of claims 19 to 28 or claim 37, or a polypeptide complex as claimed in claim 29 for the screening of candidate pharmaceutical agents.

60. Use of a polypeptide as claimed in any one of claims 19 to 28 or claim 37, or a polypeptide complex as claimed in claim 29 for the screening of candidate pharmaceutical agents useful for the treatment of epilepsy.

61. Use of a polypeptide as claimed in any one of claims 19 to 28 or claim 37, or a polypeptide complex as claimed in claim 29 for the screening of candidate pharmaceutical agents useful for the treatment of a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic

fibrosis, congenital stationary night blindness or total colour-blindness.

62. Use of a cell as claimed in any one of claims 31 to 35 for the screening of candidate pharmaceutical agents.

63. Use of a cell as claimed in any one of claims 31 to 35 for the screening of candidate pharmaceutical agents useful for the treatment of epilepsy.

64. Use of a cell as claimed in any one of claims 31 to 35 for the screening of candidate pharmaceutical agents useful for the treatment of a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.

65. A compound when identified through a use as claimed in any one of claims 56 to 64.

66. A pharmaceutical composition comprising a compound as claimed in claim 65 and a pharmaceutically acceptable carrier.

67. A genetically modified non-human animal comprising an isolated nucleic acid molecule as claimed in any one of claims 8 to 18.

68. A genetically modified, non-human animal which comprises two or more isolated nucleic acid molecules as claimed in any one of claims 8 to 18.

5   69. A genetically modified non-human animal as claimed in either one of claims 67 or 68 in which the animal is selected from the group consisting of rats, mice, hamsters, guinea pigs, rabbits, dogs, cats, goats, sheep, pigs and non-human primates such as monkeys and
10 chimpanzees.

70. A method of producing a non-human transgenic animal comprising a combination of two or more ion channel mutations, comprising the steps of:

15   (1) creating a non-human transgenic animal comprising a first nucleic acid molecule as claimed in any one of claims 8 to 18;
                (2) creating one or more additional non-human, transgenic animals comprising a second nucleic
20   acid molecule as claimed in any one of claims 8 to 18; and
                (3) conducting mating combinations so as to produce progeny containing combinations of two or more ion channel mutations which
25   effectively mimic combinations of ion channel mutations responsible for human disease.

71. A non-human, transgenic animal produced by the process of claim 70.

30
72. The use of a genetically modified non-human animal as claimed in any one of claims 67 to 69 or a non-human transgenic animal as claimed in claim 71 in the screening of candidate pharmaceutical compounds.

35
73. The use of a genetically modified non-human animal as claimed in any one of claims 67 to 69 or a non-human

transgenic animal as claimed in claim 71 in the screening of candidate pharmaceutical compounds useful in the treatment of epilepsy.

5   74. The use of a genetically modified non-human animal as claimed in any one of claims 67 to 69 or a non-human transgenic animal as claimed in claim 71 in the screening of candidate pharmaceutical compounds useful in the treatment of a disorder associated with ion channel

10   dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety,

15   depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-

20   blindness.

       75. The use of an isolated nucleic acid molecule as claimed in any one of claims 8 to 18 for the diagnosis or prognosis of epilepsy.

25
       76. The use of an isolated nucleic acid molecule as claimed in any one of claims 8 to 18 for the diagnosis or prognosis of a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or

30   hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain,

35   inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, .

congenital stationary night blindness or total colour-
blindness.

77. The use of a polypeptide as defined in any one of
claims 19 to 28 or claim 37, or polypeptide complex as
claimed in claim 29 in the diagnosis or prognosis of
epilepsy.

78. The use of a polypeptide as defined in any one of
claims 19 to 28 or claim 37, or polypeptide complex as
claimed in claim 29 in the diagnosis or prognosis of a
disorder associated with ion channel dysfunction,
including but not restricted to, hyper- or hypo-kalemic
periodic paralysis, myotonias, malignant hyperthermia,
myasthenia, cardiac arrhythmias, episodic ataxia,
migraine, Alzheimer's disease, Parkinson's disease,
schizophrenia, hyperekplexia, anxiety, depression, phobic
obsessive symptoms, neuropathic pain, inflammatory pain,
chronic/acute pain, Bartter's syndrome, polycystic kidney
disease, Dent's disease, hyperinsulinemic hypoglycemia of
infancy, cystic fibrosis, congenital stationary night
blindness or total colour-blindness.

79. The use of an antibody as claimed in either one of
claims 38 or 39 in the diagnosis or prognosis of epilepsy.

80. The use of an antibody as claimed in either one of
claims 38 or 39 in the diagnosis or prognosis of a
disorder associated with ion channel dysfunction,
including but not restricted to, hyper- or hypo-kalemic
periodic paralysis, myotonias, malignant hyperthermia,
myasthenia, cardiac arrhythmias, episodic ataxia,
migraine, Alzheimer's disease, Parkinson's disease,
schizophrenia, hyperekplexia, anxiety, depression, phobic
obsessive symptoms, neuropathic pain, inflammatory pain,
chronic/acute pain, Bartter's syndrome, polycystic kidney
disease, Dent's disease, hyperinsulinemic hypoglycemia of

infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness.

81. A method for the diagnosis or prognosis of epilepsy comprising the steps of:

       (1)   obtaining DNA from a subject; and

       (2)   comparing the DNA of one or more subunits of ion channels from said subject to the DNA of the corresponding native subunits;

wherein identification of one or more DNA molecules as claimed in any one of claims 8 to 18 is an indication of epilepsy, or a predisposition thereto.

82. A method for the diagnosis or prognosis of a disorder associated with ion channel dysfunction, including but not restricted to, hyper- or hypo-kalemic periodic paralysis, myotonias, malignant hyperthermia, myasthenia, cardiac arrhythmias, episodic ataxia, migraine, Alzheimer's disease, Parkinson's disease, schizophrenia, hyperekplexia, anxiety, depression, phobic obsessive symptoms, neuropathic pain, inflammatory pain, chronic/acute pain, Bartter's syndrome, polycystic kidney disease, Dent's disease, hyperinsulinemic hypoglycemia of infancy, cystic fibrosis, congenital stationary night blindness or total colour-blindness, comprising the steps of:

       (1)   obtaining DNA from a subject; and

       (2)   comparing the DNA of one or more subunits of ion channels from said subject to the DNA of the corresponding native subunits;

wherein identification of one or more DNA molecules as claimed in any one of claims 8 to 18 is an indication of the disorder, or a predisposition thereto.

83. A method as claimed in either one of claims 81 or 82 wherein each DNA fragment is sequenced and the sequences compared.

84. A method as claimed in either one of claims 81 or 82 wherein the DNA fragments are subjected to restriction enzyme analysis.

85. A method as claimed in either one of claims 81 or 82 wherein the DNA fragments are subjected to SSCP analysis.

1/5

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B   IGE: Outbred Population

C   IGE: Inbred Population

D   IGE: Autosomal Dominant
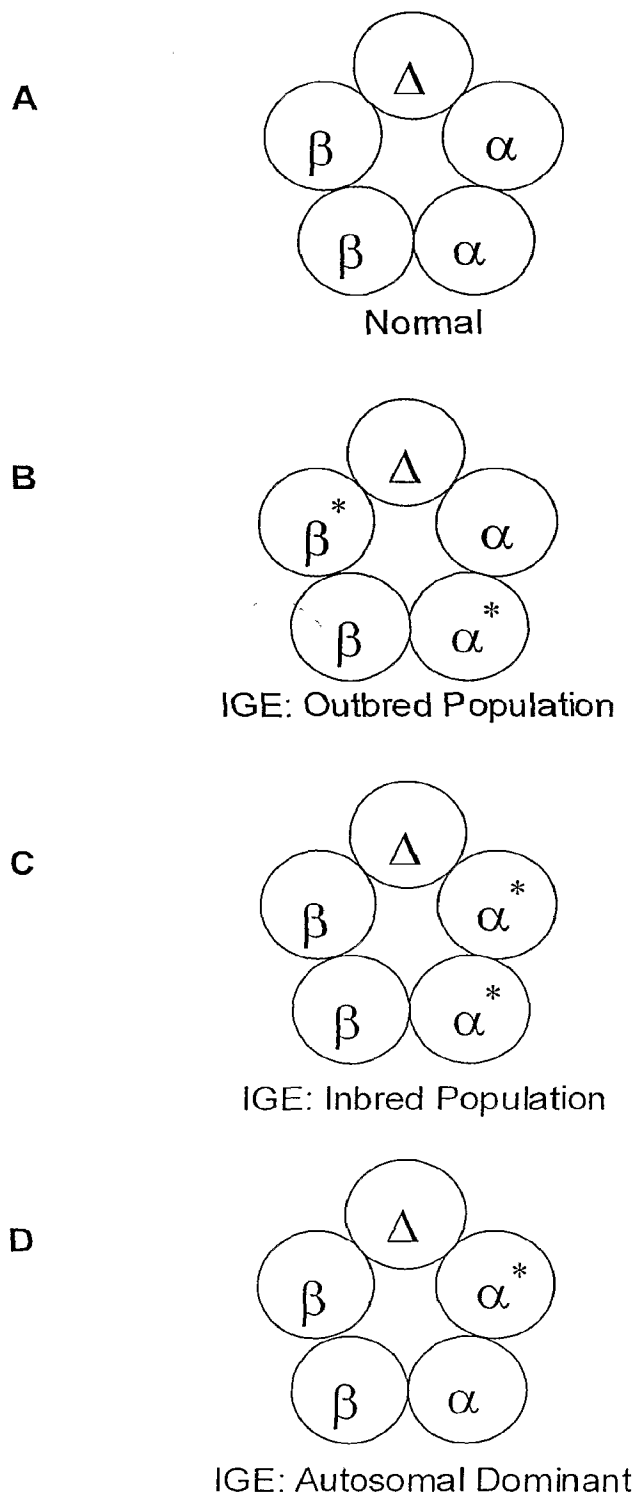
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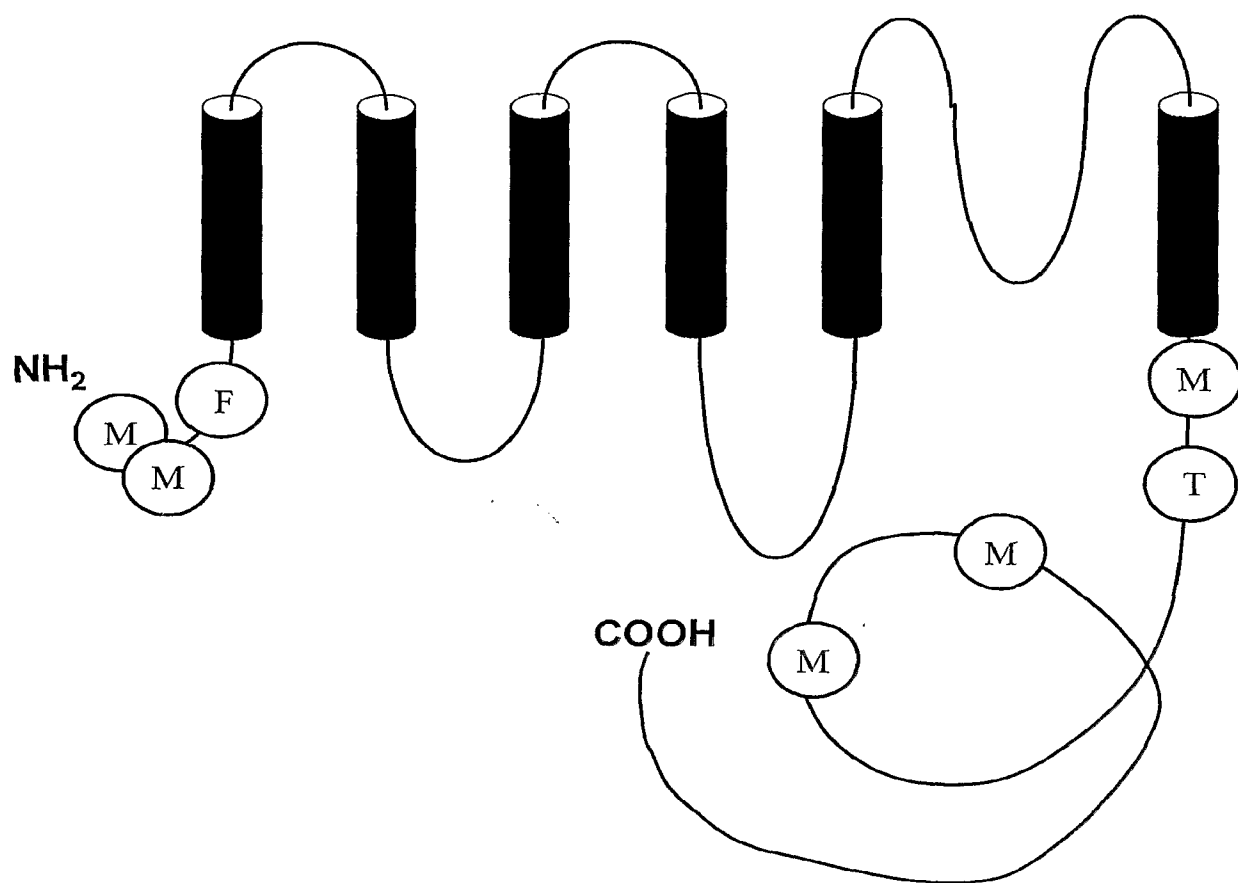
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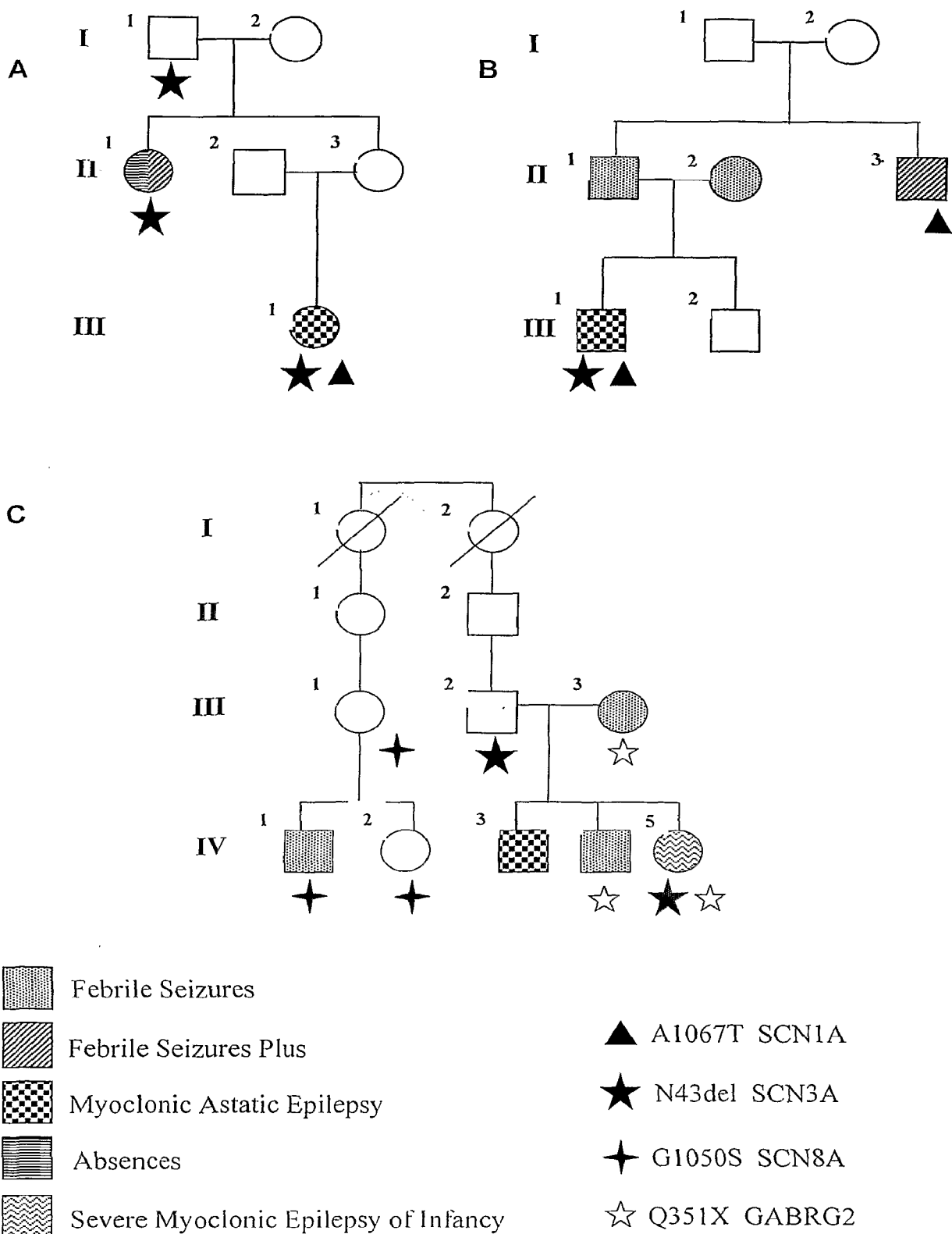
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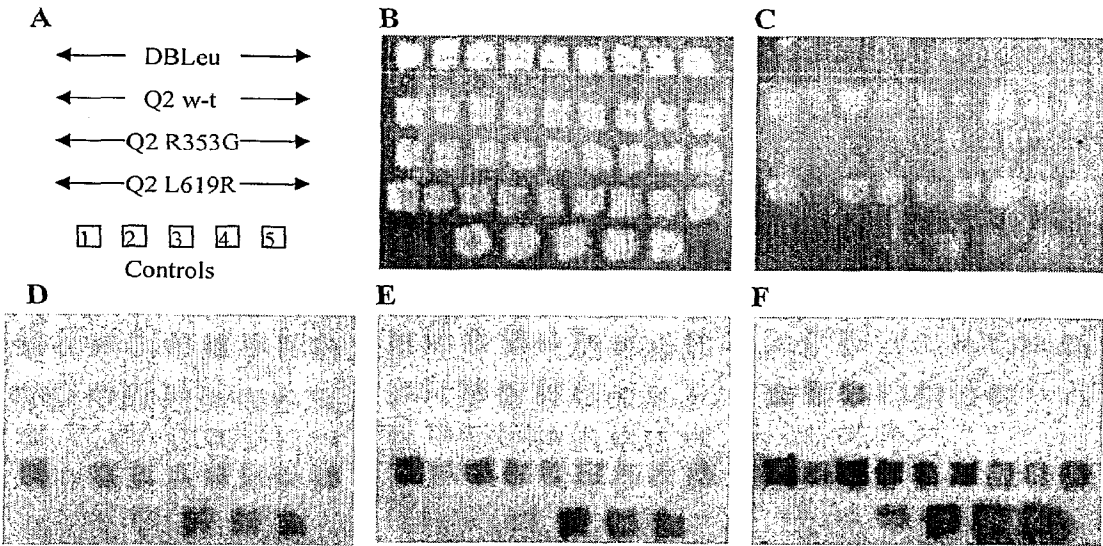
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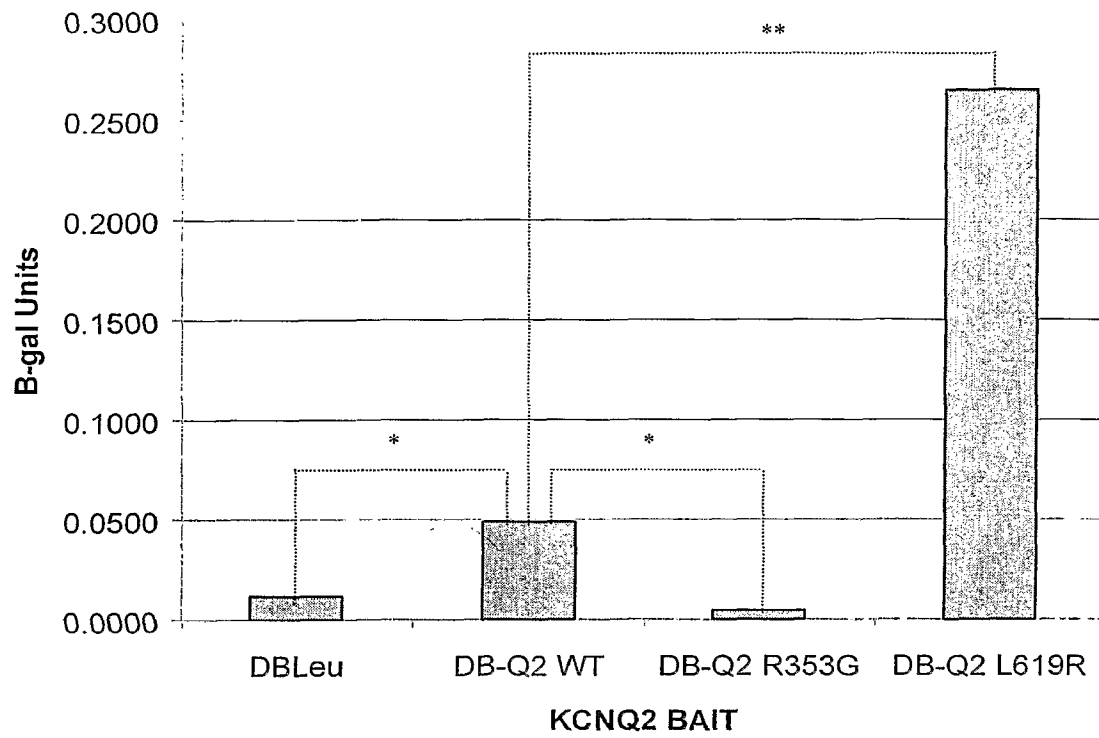
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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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ctggtaccgc caggacctga cagcttccgc ttctttacca gggaatccct tgctgctatt       180

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cagaaagcct ttgttaggaa gcagaaagct ttagatgaaa ttaaaccgct tgaagatcta   3240

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SSCP Update Sequences.ST25

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gagcacaatt ggttcgaaac cttcattgtc ttcatgattc tgctgagcag tggggctctg    3780

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SSCP Update Sequences.ST25

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gatcccgatg cgacccagtt tatagagttt gccaaacttt ctgattttgc agatgccctg    5580

gatcctcctc ttctcatagc aaaacccaac aaagtccagc tcattgccat ggatctgccc    5640

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aaaaaggtat caagtatata caagaaagac aaaggcaaag aatgtgatgg aacacccatc    5940

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gtgtttgtgt caacaggact cccacaggag gtctatgcca aactgactgt ttttacaaat    6240

gtatacttaa ggtcagtgcc tataacaaga cagagacctc tggtcagcaa actggaactc    6300

agtaaactgg agaaatagta tcgatggg                                       6328
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<213>  Homo sapiens

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ctcagaacat tccagagagc ccagtgcagc aggcaggctc tcagacagct catctgaagc    180

ctctaagttg agttccaaga gtgctaagga aagaagaaat cggaggaaga aaagaaaaca    240

gaaagagcag tctggtgggg aagagaaaga tgaggatgaa ttccaaaaat ctgaatctga    300

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aaagaggtac tcctccccac accag                                          385
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<212>  DNA
<213>  Homo sapiens

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atcatctttg ggtccttctt caccttgaac ctgtttattg gtgtcatcat agataatttc    120

aaccagcaga aaaagaagat aagtatttct aatattttct ctcccactga aatagaaaat    180
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SSCP Update Sequences.ST25
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<211>   274
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tgagcagcga aaaaccatta agaccatgtt agaatatgct gacaaggttt tcacttacat   180

attcattctg gaaatgctgc taaagtgggt tgcatatggt tttcaagtgt attttaccaa   240

tgcctggtgc tggctagact cctgattgt tgat   274

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ggatattatg tatgcagctg ttgattcacg aaat   154

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ccctattaga aaattagcta ttaagatttt ggtacattc   219

SSCP Update Sequences.ST25

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<210>   26
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SSCP Update Sequences.ST25

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atctgaaggc agcacggttg atattggagc tcccgccgag ggagaacagc ctgaggttga       180

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aaaataatta aatgtgtttt tttgtgggat tgattttcag aagctaaatg caactagttc      ·120

atctgaaggc agcacggttg atattggagc tcccgccgag ggagaacagc ctgaggttga       180

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<213>    Homo sapiens

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<213>    Homo sapiens

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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aaaatcacag tccgtgagtc ttccagctgc caccacggct gggacacgct ggggggagggc     4860

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ccagagagac ctgctgccgg agagaagggg aggaggactc cagctgggct cggtccccca      5220

cagtcaggga cccccataaa ggacacccc ttctctctag aaagagctgg gctctcagct       5280

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tatgtccagg gcatggggg ggcgtgaaga ggcctggtca gggcctttag gggctgcagg       6060

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gcgccagcaa ggaggggccg gtccccgggg ctaccaggca ggcacgtgca catcgccatc      6660

gccacacgcc aactccgcct gggtttttaca aagtcgttgc cttaatgcat gtggacagga     6720

actccctgag gtcgccccat gcccctggc tgtgccaggt acggacgccc tggaccctgc       6780
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SSCP Update Sequences.ST25

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gaacaggtgg ggcgggcgag gggcccaagg gacgggctcc agagacacgc gcagggcagg    6840

agggggtctca cggaggggtc tcgcactgag gcgcccagag ctggtggtcc cgctggacgc    6900

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cctctggctg tctgcacttt tgttcatgct ccaaagaaca tttcataatg ccttcagtac    7080

cgacgtacac ttctgaccat tttgtatgtg tccttgtgcc gtagtgacca ggcctttttt    7140

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<213>   Homo sapiens

<400>   47
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gcccccaagc gcggcagcat cctcagcaaa cctcgcgcgg gcggcgcggg cgccgggaag     240

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cggccgcgcg gctgggcgtt catctaccac gcctacgtgt tcctcctggt tttctcctgc     360

ctcgtgctgt ctgtgttttc caccatcaag gagtatgaga agagctcgga gggggccctc     420

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tcccagggca acgtctttgc cacatctgcg ctccggagcc tgcgcttcct gcagattctg     660

cggatgatcc gcatggaccg gcggggaggc acctggaagc tgctgggctc tgtggtctat     720

gcccacagca aggagctggt cactgcctgg tacatcggct cctttgtct catcctggcc     780

tcgttcctgg tgtacttggc agagaagggg gagaacgacc actttgacac ctacgcggat     840

gcactctggt ggggcctgat cacgctgacc accattggct acgggggacaa gtaccccag      900

acctggaacg gcaggctcct tgcggcaacc ttcaccctca tcggtgtctc cttcttcgcg     960

ctgcctgcag gcatcttggg gtctgggttt gccctgaagg ttcaggagca gcacaggcag    1020

aagcactttg agaagaggcg gaacccggca gcaggcctga tccagtcggc ctggagattc    1080

tacgccacca acctctcgcg cacagacctg cactccacgt ggcagtacta cgagcgaacg    1140
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SSCP Update Sequences.ST25

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ccgctgaacc agctggagct gctgaggaac ctcaagagta aatctggact cgctttcagg    1260

aaggaccccc cgccggagcc gtctccaagc cagaaggtca gtttgaaaga tcgtgtcttc    1320

tccagccccc gaggcgtggc tgccaagggg aaggggtccc cgcaggccca gactgtgagg    1380

cggtcaccca gcgccgacca gagcctcgag gacagcccca gcaaggtgcc caagagctgg    1440

agcttcgggg accgcagccg ggcacgccag gctttccgca tcaagggtgc cgcgtcacgg    1500

cagaactcag aagaagcaag cctccccgga gaggacattg tggatgacaa gagctgcccc    1560

tgcgagtttg tgaccgagga cctgaccccg ggcctcaaag tcagcatcag agccgtgtgt    1620

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atggacgtca tcgagcagta ctcagccggc cacctggaca tgctgtcccg aattaagagc    1740

ctgcagtcca gagtggacca gatcgtgggg cggggcccag cgatcacgga caaggaccgc    1800

accaagggcc cggccgaggc ggagctgccc gaggacccca gcatgatggg acggctcggg    1860

aaggtggaga gcaggtctt gtccatggag aagaagcggg acttcctggt gaatatctac    1920

atgcagcgga tgggcatccc cccgacagag accgaggcct actttggggc caaagagccg    1980

gagccggcgc cgccgtacca gagcccggaa gacagccggg agcatgtcga caggcacggc    2040

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tctggtgtgg gcatcgctac gtgttttggg ggcagcgttt cacggcggtg cccttgctgt    3060

ctcccttggg ctggctcgag cctggggtcc atgtccctt gccgtccgt catggggcag    3120

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SSCP Update Sequences.ST25

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gtgtggtgtg tcccctggga agtctctggg ccctgggaag agggaaggtg cacgtcctgg        3720

gatggttgcg gggccctgtt ttgggagaca aaggggtaga gggtctgtct tgggcccccc        3780

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SSCP Update Sequences.ST25

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                                      Page 103

SSCP Update Sequences.ST25

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<213>    Homo sapiens

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ccacctgtgc ctgtgtgcct cccccactcc agctcaactc ccacaggaag gggcttataa    180

aattatcttg cactttggga agg                                            203
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<213>    Homo sapiens

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ccttcagacg aggtgagaca gtcacatctg gagggactgc actcccctca aagccctatg    180

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<213>    Homo sapiens

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gggcttctct ctttccctgt gatgattacc atggtctgtt gtgcacacag caccaatgaa    180

cccagcaaca tgccatacgt gaaagagaca gtggacagat tgctcaaagg atatgacatt    240

cgcttgcggc cggacttcgg agggcccccc gtcgacgttg ggatgcggat cgatgtcgcc    300

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SSCP Update Sequences.ST25
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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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SSCP Update Sequences.ST25

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ttaatttctt agcttcctgt tctaataaat gcacggcttt acctttcctg tcagaaataa   2940

accaaggctc taaaagatga tttcccttct gtaactccct agagccacag gttctcattc   3000

ctttttcccat tatacttctc acaattcagt ttctatgagt ttgatcacct gatttttttta   3060

acaaatatt tctaacggga atgggtggga gtgctggtga aaagagatga aatgtggttg   3120

tatgagccaa tcatatttgt gatttttttaa aaaaagttta aaaggaaata tctgttctga   3180

aaccccactt aagcattgtt tttatataaa aacaatgata aagatgtgaa ctgtgaaata   3240

aatataccat attagctacc caccaaaaaa aaaaaaaaaa aa                      3282
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<210>    64
<211>    270
<212>    DNA
<213>    Homo sapiens

<400>    64
ggtccattcg ggaattactg cccagcagcc gactaagttg cattccttga atcttcgcag     60

aaaagacaat tcttttaatc agagttagta atgtggacag tacaaaatcg agagagtctg    120

gggcttctct cttttccctgt gatgattacc atggtctgtt gtgcacacag gtgagctgct    180

gttgttgaat ctcgctctct ctctctcttt ttttcttggt atgtttctttt ttacgtgtct    240

gctggatcat gtatcttgtt gtttgggggt                                     270
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SSCP Update Sequences.ST25

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<210>    65
<211>    238
<212>    DNA
<213>    Homo sapiens

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gtgttaataa aatcgaactt cctcaatttt caattgttga ctacaagatg gtgtctaaga      120

aggtggagtt cacaacaggt gaggttgttt cccccaaaat gtactagggg tgctgtgaaa      180

ggaagaagat ggttccaacc aaataatggg ctgattactt gtcttttgtt tctcaact        238


<210>    66
<211>    345
<212>    DNA
<213>    Homo sapiens

<400>    66
gcaccaataa ggaagtggca aatggcatct gtcctctcaa tcttgaaaaa ggaacttaat       60

agtggcgcct tcagctaagt gttgtctttc tctttcacag gaatcacgac agtgcttaca      120

atgacaacca tcagcaccca cctcagggag accctgccaa agatccctta tgtcaaagcg      180

attgatattt atctgatggg ttgctttgtg tttgtgttcc tggctctgct ggagtatgcc      240

tttgtaaatt acatcttctt tgggaaaggc cctcagaaaa agggagctag caaacaagac      300

cagagtgcca atgagaagaa taaactggag atgaataaag tccag                      345


<210>    67
<211>    190
<212>    DNA
<213>    Homo sapiens

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gggtgggccg gcgggcggcg ggcagggcgc ggggtgcgcg gggcgctggc ggctgagccg       60

cccctgaccc cgctctttgt gctccctgtc cctcccccag tgtgaacgat cccgggaaca      120

tgtcctttgt gaaggagacg gtggacaagc tgttgaaagg ctacgacatt cgcctaagac      180

ccgacttcgg                                                             190


<210>    68
<211>    253
<212>    DNA
<213>    Homo sapiens

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ttcagactta tatgccctct atactgataa cgattctgtc gtgggtgtcc ttctggatca      120

attatgatgc atctgctgct agagttgccc tcggtatgtg ctatttttaa gtgatattta      180

aatgtaaagt aaccgtatca ttacagtatt gagagttcaa aggctgtagt tcaactacca      240

tttttttgaca gcg                                                        253


<210>    69
<211>    288
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SSCP Update Sequences.ST25

<212>   DNA
<213>   Homo sapiens

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ggctggacaa gctgcagctg gcgcagttca ccatcaccag ctaccgcttc accacggagc   120

tgatgaactt caagtccggt aacatatgcc cgccgcccct tccgcatgtg cccgccgccc   180

cttccgcgcg cgcccaccgc cccttccgcg cgcgcccacc gccccttccg cgtgcgcccg   240

cctgtggttt tcatgctttt tagtcaagcc gcccgcaggc ccccaggg   288

<210>   70
<211>   288
<212>   DNA
<213>   Homo sapiens

<400>   70
acggttactc atcggaggac atcgtctact actggtcgga gagccaggag cacatccacg   60

ggctggacaa gctgcagctg gcgcagttca ccatcaccag ctaccgcttc accacggagc   120

tgatgaactt caagtccggt aacatatgcc cgccgcccct tccgcatgtg cccgccgccc   180

cttccgcgcg cgcccaccgc cccttccgcg cgcgcccacc gccccttccg cgtgcgcccg   240

cctgtggttt tcatgctttt tagtcaacgc gcccgcaggc ccccaggg   288

<210>   71
<211>   288
<212>   DNA
<213>   Homo sapiens

<400>   71
acggttactc atcggaggac atcgtctact actggtcgga gagccaggag cacatccacg   60

ggctggacaa gctgcagctg gcgcagttca ccatcaccag ctaccgcttc accacggagc   120

tgatgaactt caagtccggt aacatatgcc cgccgcccct tccgcatgtg cccgccgccc   180

cttccgcgcg cgcccaccgc cccttccgcg tgcgcccgcc tgtggttttc atgctttta   240

gtcaagcgcc cgcaggcccc cagggcctct ggggatgcag ctgggacg   288

<210>   72
<211>   170
<212>   DNA
<213>   Homo sapiens

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accggtgatg tggcttggtt tagtcatacc ctaaagattg ctcttaagag tgatcttgga   60

tgcaaatgtt catgacagtt tcctagttat tttttcttct tttcttgtag ttactacatc   120

cagattcctc aagatggatt cctgagcgaa taagcctaca agccccttcc   170

<210>   73
<211>   221
<212>   PRT
<213>   Homo sapiens

<400>   73

SSCP Update Sequences.ST25

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
                20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
                85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
        115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
    130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
                165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
            195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu
    210   215   220

<210>   74
<211>   383
<212>   PRT
<213>   Homo sapiens

<400>   74

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

SSCP Update Sequences.ST25

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
        20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
            85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
        115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
        130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
                165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
        195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
210   215   220

Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225   230   235   240

Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
            245   250   255

Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
            260   265   270

Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
        275   280   285

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SSCP Update Sequences.ST25

Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
    290   295   300

Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305   310   315   320

Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
             325   330   335

Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
         340   345   350

Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
         355   360   365

Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe
370   375   380

<210>   75
<211>   2009
<212>   PRT
<213>   Homo sapiens

<400>   75

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
         20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Glu Asn Gly
         35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
             85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
         100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
         115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
    130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
                    Page 124

SSCP Update Sequences.ST25

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    145                    150                    155                    160


    Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
                    165                    170                    175


    Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
                    180                    185                    190


    Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
                    195                    200                    205


    Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
            210                    215                    220


    Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
    225                    230                    235                    240


    Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
                    245                    250                    255


    Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
                    260                    265                    270


    Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
                    275                    280                    285


    Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
            290                    295                    300


    Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
    305                    310                    315                    320


    Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
                    325                    330                    335


    Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
                    340                    345                    350


    Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
                    355                    360                    365


    Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
            370                    375                    380


    Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Pro Gly Lys Thr Tyr Met
    385                    390                    395                    400


    Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Ile Asn
                    405                    410                    415


    Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
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SSCP Update Sequences.ST25
420   425   430

Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
        435   440   445

Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Gln Ala Ala Thr Ala
    450   455   460

Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465   470   475   480

Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
                485   490   495

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
            500   505   510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
    515   520   525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
    530   535   540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545   550   555   560

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
                565   570   575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
            580   585   590

Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
    595   600   605

Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
610   615   620

Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625   630   635   640

Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
                645   650   655

Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
            660   665   670

Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
    675   680   685

Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu

SSCP Update Sequences.ST25
690   695   700

Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705   710   715   720

Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
              725   730   735

Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
          740   745   750

Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
          755   760   765

Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
    770   775   780

Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785   790   795   800

Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
              805   810   815

Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
          820   825   830

Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
          835   840   845

Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
    850   855   860

Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865   870   875   880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
          885   890   895

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
          900   905   910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
          915   920   925

Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930   935   940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945   950   955   960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
                            Page 127

SSCP Update Sequences.ST25
965   970   975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
            980   985   990

Ser Ser Phe Ser Ala Asp Asn Leu Ala Ala Thr Asp Asp Asp Asn Glu
        995   1000   1005

Met Asn Asn Leu Gln Ile Ala Val Asp Arg Met His Lys Gly Val
    1010   1015   1020

Ala Tyr Val Lys Arg Lys Ile Tyr Glu Phe Ile Gln Gln Ser Phe
    1025   1030   1035

Ile Arg Lys Gln Lys Ile Leu Asp Glu Ile Lys Pro Leu Asp Asp
    1040   1045   1050

Leu Asn Asn Lys Lys Asp Ser Cys Met Ser Asn His Thr Thr Glu
    1055   1060   1065

Ile Gly Lys Asp Leu Asp Tyr Leu Lys Asp Val Asn Gly Thr Thr
    1070   1075   1080

Ser Gly Ile Gly Thr Gly Ser Ser Val Glu Lys Tyr Ile Ile Asp
    1085   1090   1095

Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn Pro Ser Leu Thr Val
    1100   1105   1110

Thr Val Pro Ile Ala Val Gly Glu Ser Asp Phe Glu Asn Leu Asn
    1115   1120   1125

Thr Glu Asp Phe Ser Ser Glu Ser Asp Leu Glu Glu Ser Lys Glu
    1130   1135   1140

Lys Leu Asn Glu Ser Ser Ser Ser Ser Glu Gly Ser Thr Val Asp
    1145   1150   1155

Ile Gly Ala Pro Val Glu Glu Gln Pro Val Val Glu Pro Glu Glu
    1160   1165   1170

Thr Leu Glu Pro Glu Ala Cys Phe Thr Glu Gly Cys Val Gln Arg
    1175   1180   1185

Phe Lys Cys Cys Gln Ile Asn Val Glu Glu Gly Arg Gly Lys Gln
    1190   1195   1200

Trp Trp Asn Leu Arg Arg Thr Cys Phe Arg Ile Val Glu His Asn
    1205   1210   1215

Trp Phe Glu Thr Phe Ile Val Phe Met Ile Leu Leu Ser Ser Gly

SSCP Update Sequences.ST25
1220   1225   1230

Ala Leu Ala Phe Glu Asp Ile Tyr Ile Asp Gln Arg Lys Thr Ile
    1235   1240   1245

Lys Thr Met Leu Glu Tyr Ala Asp Lys Val Phe Thr Tyr Ile Phe
    1250   1255   1260

Ile Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Tyr Gln Thr
    1265   1270   1275

Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp
    1280   1285   1290

Val Ser Leu Val Ser Leu Thr Ala Asn Ala Leu Gly Tyr Ser Glu
    1295   1300   1305

Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro
    1310   1315   1320

Leu Arg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Val Asn
    1325   1330   1335

Ala Leu Leu Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val
    1340   1345   1350

Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu
    1355   1360   1365

Phe Ala Gly Lys Phe Tyr His Cys Ile Asn Thr Thr Thr Gly Asp
    1370   1375   1380

Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
    1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala Arg Trp Lys Asn Val Lys Val
    1400   1405   1410

Asn Phe Asp Asn Val Gly Phe Gly Tyr Leu Ser Leu Leu Gln Val
    1415   1420   1425

Ala Thr Phe Lys Gly Trp Met Asp Ile Met Tyr Ala Ala Val Asp
    1430   1435   1440

Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr Glu Lys Ser Leu Tyr
    1445   1450   1455

Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile Phe Gly Ser Phe Phe
    1460   1465   1470

Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn Phe Asn Gln
                              Page 129

SSCP Update Sequences.ST25
      1475   1480   1485

Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile Phe Met Thr Glu Glu
    1490   1495   1500

Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys Lys
    1505   1510   1515

Pro Gln Lys Pro Ile Pro Arg Pro Gly Asn Lys Phe Gln Gly Met
    1520   1525   1530

Val Phe Asp Phe Val Thr Arg Gln Val Phe Asp Ile Ser Ile Met
    1535   1540   1545

Ile Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp
    1550   1555   1560

Asp Gln Ser Glu Tyr Val Thr Thr Ile Leu Ser Arg Ile Asn Leu
    1565   1570   1575

Val Phe Ile Val Leu Phe Thr Gly Glu Cys Val Leu Lys Leu Ile
    1580   1585   1590

Ser Leu Arg His Tyr Tyr Phe Thr Ile Gly Trp Asn Ile Phe Asp
    1595   1600   1605

Phe Val Val Val Ile Leu Ser Ile Val Gly Met Phe Leu Ala Glu
    1610   1615   1620

Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr Leu Phe Arg Val Ile
    1625   1630   1635

Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg Leu Ile Lys Gly Ala
    1640   1645   1650

Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu Met Met Ser Leu Pro
    1655   1660   1665

Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe Leu Val Met Phe Ile
    1670   1675   1680

Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala Tyr Val Lys Arg Glu
    1685   1690   1695

Val Gly Ile Asp Asp Met Phe Asn Phe Glu Thr Phe Gly Asn Ser
    1700   1705   1710

Met Ile Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly Trp Asp Gly
    1715   1720   1725

Leu Leu Ala Pro Ile Leu Asn Ser Lys Pro Pro Asp Cys Asp Pro
                              Page 130

SSCP Update Sequences.ST25
1730   1735   1740

Asn Lys Val Asn Pro Gly Ser Ser Val Lys Gly Asp Cys Gly Asn
    1745   1750   1755

Pro Ser Val Gly Ile Phe Phe Phe Val Ser Tyr Ile Ile Ile Ser
    1760   1765   1770

Phe Leu Val Val Val Asn Met Tyr Ile Ala Val Ile Leu Glu Asn
    1775   1780   1785

Phe Ser Val Ala Thr Glu Glu Ser Ala Glu Pro Leu Ser Glu Asp
    1790   1795   1800

Asp Phe Glu Met Phe Tyr Glu Val Trp Glu Lys Phe Asp Pro Asp
    1805   1810   1815

Ala Thr Gln Phe Met Glu Phe Glu Lys Leu Ser Gln Phe Ala Ala
    1820   1825   1830

Ala Leu Glu Pro Pro Leu Asn Leu Pro Gln Pro Asn Lys Leu Gln
    1835   1840   1845

Leu Ile Ala Met Asp Leu Pro Met Val Ser Gly Asp Arg Ile His
    1850   1855   1860

Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys Arg Val Leu Gly Glu
    1865   1870   1875

Ser Gly Glu Met Asp Ala Leu Arg Ile Gln Met Glu Glu Arg Phe
    1880   1885   1890

Met Ala Ser Asn Pro Ser Lys Val Ser Tyr Gln Pro Ile Thr Thr
    1895   1900   1905

Thr Leu Lys Arg Lys Gln Glu Glu Val Ser Ala Val Ile Ile Gln
    1910   1915   1920

Arg Ala Tyr Arg Arg His Leu Leu Lys Arg Thr Val Lys Gln Ala
    1925   1930   1935

Ser Phe Thr Tyr Asn Lys Asn Lys Ile Lys Gly Gly Ala Asn Leu
    1940   1945   1950

Leu Ile Lys Glu Asp Met Ile Ile Asp Arg Ile Asn Glu Asn Ser
    1955   1960   1965

Ile Thr Glu Lys Thr Asp Leu Thr Met Ser Thr Ala Ala Cys Pro
    1970   1975   1980

Pro Ser Tyr Asp Arg Val Thr Lys Pro Ile Val Glu Lys His Glu
                              Page 131

SSCP Update Sequences.ST25
    1985   1990   1995

Gln Glu Gly Lys Asp Glu Lys Ala Lys Gly Lys
    2000   2005

<210>   76
<211>   2009
<212>   PRT
<213>   Homo sapiens

<400>   76

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
            85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
        115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
    130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
            165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
        195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
    210   215   220
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```
Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225                 230             235                 240


Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
            245             250                 255


Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
            260             265                 270


Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
        275             280             285


Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
    290             295             300


Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305             310             315                 320


Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
            325             330                 335


Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
            340             345                 350


Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
        355             360             365


Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
370             375             380


Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr Tyr Met
385             390             395                 400


Ile Phe Leu Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Ile Asn
            405             410                 415


Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
            420             425                 430


Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
        435             440             445


Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Ala Ala Thr Ala
    450             455             460


Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465             470             475                 480


Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
            485             490                 495
```

SSCP Update Sequences.ST25

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
            500   505   510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
            515   520   525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
    530   535   540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545   550   555   560

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
            565   570   575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
            580   585   590

Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
        595   600   605

Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
    610   615   620

Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625   630   635   640

Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
            645   650   655

Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
            660   665   670

Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
        675   680   685

Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu
    690   695   700

Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705   710   715   720

Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
            725   730   735

Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
            740   745   750

Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
            755   760   765

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SSCP Update Sequences.ST25

```
Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
770                 775             780

Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785             790             795             800

Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
                805             810             815

Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
            820             825             830

Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
        835             840             845

Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
    850             855             860

Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865             870             875             880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
            885             890             895

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
            900             905             910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
        915             920             925

Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930             935             940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945             950             955             960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
            965             970             975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
            980             985             990

Ser Ser Phe Ser Ala Asp Asn Leu  Ala Ala Thr Asp Asp  Asp Asn Glu
        995             1000            1005

Met Asn  Asn Leu Gln Ile Ala  Val Asp Arg Met His  Lys Gly Val
    1010            1015            1020

Ala Tyr  Val Lys Arg Lys Ile  Tyr Glu Phe Ile Gln  Gln Ser Phe
    1025            1030            1035
```

SSCP Update Sequences.ST25

```
Ile Arg  Lys Gln Lys Ile Leu  Asp Glu Ile Lys Pro  Leu Asp Asp
    1040             1045             1050

Leu Asn  Asn Lys Lys Asp Ser  Cys Met Ser Asn His  Thr Thr Glu
    1055             1060             1065

Ile Gly  Lys Asp Leu Asp Tyr  Leu Lys Asp Val Asn  Gly Thr Thr
    1070             1075             1080

Ser Gly  Ile Gly Thr Gly Ser  Ser Val Glu Lys Tyr  Ile Ile Asp
    1085             1090             1095

Glu Ser  Asp Tyr Met Ser Phe  Ile Asn Asn Pro Ser  Leu Thr Val
    1100             1105             1110

Thr Val  Pro Ile Ala Val Gly  Glu Ser Asp Phe Glu  Asn Leu Asn
    1115             1120             1125

Thr Glu  Asp Phe Ser Ser Glu  Ser Asp Leu Glu Glu  Ser Lys Glu
    1130             1135             1140

Lys Leu  Asn Glu Ser Ser Ser  Ser Ser Glu Gly Ser  Thr Val Asp
    1145             1150             1155

Ile Gly  Ala Pro Val Glu Glu  Gln Pro Val Val Glu  Pro Glu Glu
    1160             1165             1170

Thr Leu  Glu Pro Glu Ala Cys  Phe Thr Glu Gly Cys  Val Gln Arg
    1175             1180             1185

Phe Lys  Cys Cys Gln Ile Asn  Val Glu Glu Gly Arg  Gly Lys Gln
    1190             1195             1200

Trp Trp  Asn Leu Arg Arg Thr  Cys Phe Arg Ile Val  Glu His Asn
    1205             1210             1215

Trp Phe  Glu Thr Phe Ile Val  Phe Met Ile Leu Leu  Ser Ser Gly
    1220             1225             1230

Ala Leu  Ala Phe Glu Asp Ile  Tyr Ile Asp Gln Arg  Lys Thr Ile
    1235             1240             1245

Lys Thr  Met Leu Glu Tyr Ala  Asp Lys Val Phe Thr  Tyr Ile Phe
    1250             1255             1260

Ile Leu  Glu Met Leu Leu Lys  Trp Val Ala Tyr Gly  Tyr Gln Thr
    1265             1270             1275

Tyr Phe  Thr Asn Ala Trp Cys  Trp Leu Asp Phe Leu  Ile Val Asp
    1280             1285             1290
```

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SSCP Update Sequences.ST25

Val Ser Leu Val Ser Leu Thr Ala Asn Ala Leu Gly Tyr Ser Glu
    1295   1300   1305

Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro
    1310   1315   1320

Leu Arg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Val Asn
    1325   1330   1335

Ala Leu Leu Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val
    1340   1345   1350

Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu
    1355   1360   1365

Phe Ala Gly Lys Phe Tyr His Cys Ile Asn Thr Thr Thr Gly Asp
    1370   1375   1380

Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
    1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala Arg Trp Lys Asn Val Lys Val
    1400   1405   1410

Asn Phe Asp Asn Val Gly Phe Gly Tyr Leu Ser Leu Leu Gln Val
    1415   1420   1425

Ala Thr Phe Lys Gly Trp Met Asp Ile Met Tyr Ala Ala Val Asp
    1430   1435   1440

Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr Glu Lys Ser Leu Tyr
    1445   1450   1455

Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile Phe Gly Ser Phe Phe
    1460   1465   1470

Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn Phe Asn Gln
    1475   1480   1485

Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile Phe Met Thr Glu Glu
    1490   1495   1500

Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys Lys
    1505   1510   1515

Pro Gln Lys Pro Ile Pro Arg Pro Gly Asn Lys Phe Gln Gly Met
    1520   1525   1530

Val Phe Asp Phe Val Thr Arg Gln Val Phe Asp Ile Ser Ile Met
    1535   1540   1545

SSCP Update Sequences.ST25

Ile Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp
    1550   1555   1560

Asp Gln Ser Glu Tyr Val Thr Thr Ile Leu Ser Arg Ile Asn Leu
    1565   1570   1575

Val Phe Ile Val Leu Phe Thr Gly Glu Cys Val Leu Lys Leu Ile
    1580   1585   1590

Ser Leu Arg His Tyr Tyr Phe Thr Ile Gly Trp Asn Ile Phe Asp
    1595   1600   1605

Phe Val Val Val Ile Leu Ser Ile Val Gly Met Phe Leu Ala Glu
    1610   1615   1620

Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr Leu Phe Arg Val Ile
    1625   1630   1635

Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg Leu Ile Lys Gly Ala
    1640   1645   1650

Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu Met Met Ser Leu Pro
    1655   1660   1665

Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe Leu Val Met Phe Ile
    1670   1675   1680

Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala Tyr Val Lys Arg Glu
    1685   1690   1695

Val Gly Ile Asp Asp Met Phe Asn Phe Glu Thr Phe Gly Asn Ser
    1700   1705   1710

Met Ile Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly Trp Asp Gly
    1715   1720   1725

Leu Leu Ala Pro Ile Leu Asn Ser Lys Pro Pro Asp Cys Asp Pro
    1730   1735   1740

Asn Lys Val Asn Pro Gly Ser Ser Val Lys Gly Asp Cys Gly Asn
    1745   1750   1755

Pro Ser Val Gly Ile Phe Phe Phe Val Ser Tyr Ile Ile Ile Ser
    1760   1765   1770

Phe Leu Val Val Val Asn Met Tyr Ile Ala Val Ile Leu Glu Asn
    1775   1780   1785

Phe Ser Val Ala Thr Glu Glu Ser Ala Glu Pro Leu Ser Glu Asp
    1790   1795   1800

SSCP Update Sequences.ST25

```
Asp Phe Glu Met Phe Tyr Glu Val Trp Glu Lys Phe Asp Pro Asp
    1805            1810            1815

Ala Thr Gln Phe Met Glu Phe Glu Lys Leu Ser Gln Phe Ala Ala
    1820            1825            1830

Ala Leu Glu Pro Pro Leu Asn Leu Pro Gln Pro Asn Lys Leu Gln
    1835            1840            1845

Leu Ile Ala Met Asp Leu Pro Met Val Ser Gly Asp Arg Ile His
    1850            1855            1860

Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys Arg Val Leu Gly Glu
    1865            1870            1875

Ser Gly Glu Met Asp Ala Leu Arg Ile Gln Met Glu Glu Arg Phe
    1880            1885            1890

Met Ala Ser Asn Pro Ser Lys Val Ser Tyr Gln Pro Ile Thr Thr
    1895            1900            1905

Thr Leu Lys Arg Lys Gln Glu Glu Val Ser Ala Val Ile Ile Gln
    1910            1915            1920

Arg Ala Tyr Arg Arg His Leu Leu Lys Arg Thr Val Lys Gln Ala
    1925            1930            1935

Ser Phe Thr Tyr Asn Lys Asn Lys Ile Lys Gly Gly Ala Asn Leu
    1940            1945            1950

Leu Ile Lys Glu Asp Met Ile Ile Asp Arg Ile Asn Glu Asn Ser
    1955            1960            1965

Ile Thr Glu Lys Thr Asp Leu Thr Met Ser Thr Ala Ala Cys Pro
    1970            1975            1980

Pro Ser Tyr Asp Arg Val Thr Lys Pro Ile Val Glu Lys His Glu
    1985            1990            1995

Gln Glu Gly Lys Asp Glu Lys Ala Lys Gly Lys
    2000            2005
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<210>   77
<211>   2009
<212>   PRT
<213>   Homo sapiens

<400>   77

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1               5                   10                  15
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SSCP Update Sequences.ST25

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
        20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
        50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
            85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
        115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
        130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
            165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
        195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
210   215   220

Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225   230   235   240

Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
            245   250   255

Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
            260   265   270

Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
        275   280   285

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SSCP Update Sequences.ST25

Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
    290   295   300

Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305   310   315   320

Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
            325   330   335

Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
            340   345   350

Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
            355   360   365

Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
    370   375   380

Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr Tyr Met
385   390   395   400

Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Asn Leu Ile Asn
            405   410   415

Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
            420   425   430

Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
            435   440   445

Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Gln Ala Ala Thr Ala
    450   455   460

Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465   470   475   480

Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
            485   490   495

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
            500   505   510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
    515   520   525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
    530   535   540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545   550   555   560

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SSCP Update Sequences.ST25

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
            565   570   575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
            580   585   590

Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
        595   600   605

Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
    610   615   620

Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625   630   635   640

Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
            645   650   655

Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
            660   665   670

Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
        675   680   685

Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu
    690   695   700

Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705   710   715   720

Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
            725   730   735

Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
            740   745   750

Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
            755   760   765

Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
    770   775   780

Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785   790   795   800

Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
            805   810   815

Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
            820   825   830

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Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
        835   840   845

Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
    850   855   860

Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865   870   875   880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
            885   890   895

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
            900   905   910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
        915   920   925

Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930   935   940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945   950   955   960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
            965   970   975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
            980   985   990

Ser Ser Phe Ser Ala Asp Asn Leu Ala Ala Thr Asp Asp Asp Asn Glu
        995   1000   1005

Met Asn Asn Leu Gln Ile Ala Val Asp Arg Met His Lys Gly Val
    1010   1015   1020

Ala Tyr Val Lys Arg Lys Ile Tyr Glu Phe Ile Gln Gln Ser Phe
    1025   1030   1035

Ile Arg Lys Gln Lys Ile Leu Asp Glu Ile Lys Pro Leu Asp Asp
    1040   1045   1050

Leu Asn Asn Lys Lys Asp Ser Cys Met Ser Asn His Thr Thr Glu
    1055   1060   1065

Ile Gly Lys Asp Leu Asp Tyr Leu Lys Asp Val Asn Gly Thr Thr
    1070   1075   1080

Ser Gly Ile Gly Thr Gly Ser Ser Val Glu Lys Tyr Ile Ile Asp
    1085   1090   1095

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SSCP Update Sequences.ST25

Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn Pro Ser Leu Thr Val
    1100   1105   1110

Thr Val Pro Ile Ala Val Gly Glu Ser Asp Phe Glu Asn Leu Asn
    1115   1120   1125

Thr Glu Asp,Phe Ser Ser Glu Ser Asp Leu Glu Glu Ser Lys Glu
    1130   1135   1140

Lys Leu Asn Glu Ser Ser Ser Ser Ser Glu Gly Ser Thr Val Asp
    1145   1150   1155

Ile Gly Ala Pro Val Glu Glu Gln Pro Val Val Glu Pro Glu Glu
    1160   1165   1170

Thr Leu Glu Pro Glu Ala Cys Phe Thr Glu Gly Cys Val Gln Arg
    1175   1180   1185

Phe Lys Cys Cys Gln Ile Asn Val Glu Glu Gly Arg Gly Lys Gln
    1190   1195   1200

Trp Trp Asn Leu Arg Arg Thr Cys Phe Arg Ile Val Glu His Asn
    1205   1210   1215

Trp Phe Glu Thr Phe Ile Val Phe Met Ile Leu Leu Ser Ser Gly
    1220   1225   1230

Ala Leu Ala Phe Glu Asp Ile Tyr Ile Asp Gln Arg Lys Thr Ile
    1235   1240   1245

Lys Thr Met Leu Glu Tyr Ala Asp Lys Val Phe Thr Tyr Ile Phe
    1250   1255   1260

Ile Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Tyr Gln Thr
    1265   1270   1275

Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp
    1280   1285   1290

Val Ser Leu Val Ser Leu Thr Ala Asn Ala Leu Gly Tyr Ser Glu
    1295   1300   1305

Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro
    1310   1315   1320

Leu Arg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Val Asn
    1325   1330   1335

Ala Leu Leu Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val
    1340   1345   1350

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SSCP Update Sequences.ST25

Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu
1355   1360   1365

Phe Ala Gly Lys Phe Tyr His Cys Ile Asn Thr Thr Thr Gly Asp
1370   1375   1380

Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala Arg Trp Lys Asn Val Lys Val
1400   1405   1410

Asn Phe Asp Asn Val Gly Phe Gly Tyr Leu Ser Leu Leu Gln Val
1415   1420   1425

Ala Thr Phe Lys Gly Trp Met Asp Ile Met Tyr Ala Ala Val Asp
1430   1435   1440

Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr Glu Lys Ser Leu Tyr
1445   1450   1455

Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile Phe Gly Ser Phe Phe
1460   1465   1470

Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn Phe Asn Gln
1475   1480   1485

Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile Phe Met Thr Glu Glu
1490   1495   1500

Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys Lys
1505   1510   1515

Pro Gln Lys Pro Ile Pro Arg Pro Gly Asn Lys Phe Gln Gly Met
1520   1525   1530

Val Phe Asp Phe Val Thr Arg Gln Val Phe Asp Ile Ser Ile Met
1535   1540   1545

Ile Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp
1550   1555   1560

Asp Gln Ser Glu Tyr Val Thr Thr Ile Leu Ser Arg Ile Asn Leu
1565   1570   1575

Val Phe Ile Val Leu Phe Thr Gly Glu Cys Val Leu Lys Leu Ile
1580   1585   1590

Ser Leu Arg His Tyr Tyr Phe Thr Ile Gly Trp Asn Ile Phe Asp
1595   1600   1605

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Phe Val Val Val Ile Leu Ser Ile Val Gly Met Phe Leu Ala Glu
    1610   1615   1620

Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr Leu Phe Arg Val Ile
    1625   1630   1635

Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg Leu Ile Lys Gly Ala
    1640   1645   1650

Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu Met Met Ser Leu Pro
    1655   1660   1665

Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe Leu Val Met Phe Ile
    1670   1675   1680

Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala Tyr Val Lys Arg Glu
    1685   1690   1695

Val Gly Ile Asp Asp Met Phe Asn Phe Glu Thr Phe Gly Asn Ser
    1700   1705   1710

Met Ile Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly Trp Asp Gly
    1715   1720   1725

Leu Leu Ala Pro Ile Leu Asn Ser Lys Pro Pro Asp Cys Asp Pro
    1730   1735   1740

Asn Lys Val Asn Pro Gly Ser Ser Val Lys Gly Asp Cys Gly Asn
    1745   1750   1755

Pro Ser Val Gly Ile Phe Phe Phe Val Ser Tyr Ile Ile Ile Ser
    1760   1765   1770

Phe Leu Val Val Val Asn Met Tyr Ile Ala Val Ile Leu Glu Asn
    1775   1780   1785

Phe Ser Val Ala Thr Glu Glu Ser Ala Glu Pro Leu Ser Glu Asp
    1790   1795   1800

Asp Phe Glu Met Phe Tyr Glu Val Trp Glu Lys Phe Asp Pro Asp
    1805   1810   1815

Ala Thr Gln Phe Met Glu Phe Glu Lys Leu Ser Gln Phe Ala Ala
    1820   1825   1830

Ala Leu Glu Pro Pro Leu Asn Leu Pro Gln Pro Asn Lys Leu Gln
    1835   1840   1845

Leu Ile Ala Met Asp Leu Pro Met Val Ser Gly Asp Arg Ile His
    1850   1855   1860

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Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys Arg Val Leu Gly Glu
    1865   1870   1875

Ser Gly Glu Met Asp Ala Leu Arg Ile Gln Met Glu Glu Arg Phe
    1880   1885   1890

Met Ala Ser Asn Pro Ser Lys Val Ser Tyr Gln Pro Ile Thr Thr
    1895   1900   1905

Thr Leu Lys Arg Lys Gln Glu Glu Val Ser Ala Val Ile Ile Gln
    1910   1915   1920

Arg Ala Tyr Arg Arg His Leu Leu Lys Arg Thr Val Lys Gln Ala
    1925   1930   1935

Ser Phe Thr Tyr Asn Lys Asn Lys Ile Lys Gly Gly Ala Asn Leu
    1940   1945   1950

Leu Ile Lys Glu Asp Met Ile Ile Asp Arg Ile Asn Glu Asn Ser
    1955   1960   1965

Ile Thr Glu Lys Thr Asp Leu Thr Met Ser Thr Ala Ala Cys Pro
    1970   1975   1980

Pro Ser Tyr Asp Arg Val Thr Lys Pro Ile Val Glu Lys His Glu
    1985   1990   1995

Gln Glu Gly Lys Asp Glu Lys Ala Lys Gly Lys
    2000   2005

<210>   78
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<400>   78

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

SSCP Update Sequences.ST25

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
                    85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
                100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
            115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
        130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
                165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
        195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
    210   215   220

Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225   230   235   240

Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
                245   250   255

Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
            260   265   270

Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
        275   280   285

Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
    290   295   300

Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305   310   315   320

Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
            325   330   335

Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
            340   345   350

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SSCP Update Sequences.ST25

```
Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
        355             360             365

Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
    370             375             380

Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr Tyr Met
385             390             395             400

Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Ile Asn
            405             410             415

Leu Ile Leu Ala Val Glu Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
        420             425             430

Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
        435             440             445

Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Gln Ala Ala Thr Ala
    450             455             460

Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465             470             475             480

Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
            485             490             495

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
        500             505             510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
    515             520             525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
    530             535             540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545             550             555             560

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
            565             570             575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
        580             585             590

Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
        595             600             605

Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
    610             615             620
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SSCP Update Sequences.ST25

Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625   630   635   640

Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
                645   650   655

Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
            660   665   670

Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
        675   680   685

Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu
    690   695   700

Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705   710   715   720

Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
                725   730   735

Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
            740   745   750

Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
        755   760   765

Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
770   775   780

Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785   790   795   800

Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
                805   810   815

Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
            820   825   830

Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
        835   840   845

Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
850   855   860

Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865   870   875   880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
            885   890   895

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SSCP Update Sequences.ST25

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
                900   905   910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
        915   920   925
.

Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930   935   940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945   950   955   960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
                965   970   975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
                980   985   990

Ser Ser Phe Ser Ala Asp Asn Leu Ala Ala Thr Asp Asp Asp Asn Glu
        995   1000   1005

Met Asn Asn Leu Gln Ile Ala Val Asp Arg Met His Lys Gly Val
    1010   1015   1020

Ala Tyr Val Lys Arg Lys Ile Tyr Glu Phe Ile Gln Gln Ser Phe
    1025   1030   1035

Ile Arg Lys Gln Lys Ile Leu Asp Glu Ile Lys Pro Leu Asp Asp
    1040   1045   1050

Leu Asn Asn Lys Lys Asp Ser Cys Met Ser Asn His Thr Thr Glu
    1055   1060   1065

Ile Gly Lys Asp Leu Asp Tyr Leu Lys Asp Val Asn Gly Thr Thr
    1070   1075   1080

Ser Gly Ile Gly Thr Gly Ser Ser Val Glu Lys Tyr Ile Ile Asp
    1085   1090   1095

Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn Pro Ser Leu Thr Val
    1100   1105   1110

Thr Val Pro Ile Ala Val Gly Glu Ser Asp Phe Glu Asn Leu Asn
    1115   1120   1125

Thr Glu Asp Phe Ser Ser Glu Ser Asp Leu Glu Glu Ser Lys Glu
    1130   1135   1140

Lys Leu Asn Glu Ser Ser Ser Ser Ser Glu Gly Ser Thr Val Asp
    1145   1150   1155

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SSCP Update Sequences.ST25

Ile Gly Ala Pro Val Glu Glu Gln Pro Val Val Glu Pro Glu Glu
    1160   1165   1170

Thr Leu Glu Pro Glu Ala Cys Phe Thr Glu Gly Cys Val Gln Arg
    1175   1180   1185

Phe Lys Cys Cys Gln Ile Asn Val Glu Glu Gly Arg Gly Lys Gln
    1190   1195   1200

Trp Trp Asn Leu Arg Arg Thr Cys Phe Arg Ile Val Glu His Asn
    1205   1210   1215

Trp Phe Glu Thr Phe Ile Val Phe Met Ile Leu Leu Ser Ser Gly
    1220   1225   1230

Ala Leu Ala Phe Glu Asp Ile Tyr Ile Asp Gln Arg Lys Thr Ile
    1235   1240   1245

Lys Thr Met Leu Glu Tyr Ala Asp Lys Val Phe Thr Tyr Ile Phe
    1250   1255   1260

Ile Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Tyr Gln Thr
    1265   1270   1275

Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp
    1280   1285   1290

Val Ser Leu Val Ser Leu Thr Ala Asn Ala Leu Gly Tyr Ser Glu
    1295   1300   1305

Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro
    1310   1315   1320

Leu Arg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Val Asn
    1325   1330   1335

Ala Leu Leu Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val
    1340   1345   1350

Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu
    1355   1360   1365

Phe Ala Gly Lys Phe Tyr His Cys Ile Asn Thr Thr Thr Gly Asp
    1370   1375   1380

Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
    1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala Arg Trp Lys Asn Val Lys Val
    1400   1405   1410

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SSCP Update Sequences.ST25

Asn Phe Asp Asn Val Gly Phe Gly Tyr Leu Ser Leu Leu Gln Val
    1415   1420   1425

Ala Thr Phe Lys Gly Trp Met Asp Ile Met Tyr Ala Ala Val Asp
    1430   1435   1440

Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr Glu Lys Ser Leu Tyr
    1445   1450   1455

Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile Phe Gly Ser Phe Phe
    1460   1465   1470

Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn Phe Asn Gln
    1475   1480   1485

Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile Phe Met Thr Glu Glu
    1490   1495   1500

Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys Lys
    1505   1510   1515

Pro Gln Lys Pro Ile Pro Arg Pro Gly Asn Lys Phe Gln Gly Met
    1520   1525   1530

Val Phe Asp Phe Val Thr Arg Gln Val Phe Asp Ile Ser Ile Met
    1535   1540   1545

Ile Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp
    1550   1555   1560

Asp Gln Ser Glu Tyr Val Thr Thr Ile Leu Ser Arg Ile Asn Leu
    1565   1570   1575

Val Phe Ile Val Leu Phe Thr Gly Glu Cys Val Leu Lys Leu Ile
    1580   1585   1590

Ser Leu Arg His Tyr Tyr Phe Thr Ile Gly Trp Asn Ile Phe Asp
    1595   1600   1605

Phe Val Val Val Ile Leu Ser Ile Val Gly Met Phe Leu Ala Glu
    1610   1615   1620

Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr Leu Phe Arg Val Ile
    1625   1630   1635

Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg Leu Ile Lys Gly Ala
    1640   1645   1650

Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu Met Met Ser Leu Pro
    1655   1660   1665

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SSCP Update Sequences.ST25

```
Ala Leu  Phe Asn Ile Gly Leu  Leu Leu Phe Leu Val  Met Phe Ile
    1670                1675                1680

Tyr Ala  Ile Phe Gly Met Ser  Asn Phe Ala Tyr Val  Lys Arg Glu
    1685                1690                1695

Val Gly  Ile Asp Asp Met Phe  Asn Phe Glu Thr Phe  Gly Asn Ser
    1700                1705                1710

Met Ile  Cys Leu Phe Gln Ile  Thr Thr Ser Ala Gly  Trp Asp Gly
    1715                1720                1725

Leu Leu  Ala Pro Ile Leu Asn  Ser Lys Pro Pro Asp  Cys Asp Pro
    1730                1735                1740

Asn Lys  Val Asn Pro Gly Ser  Ser Val Lys Gly Asp  Cys Gly Asn
    1745                1750                1755

Pro Ser  Val Gly Ile Phe Phe  Phe Val Ser Tyr Ile  Ile Ile Ser
    1760                1765                1770

Phe Leu  Val Val Val Asn Met  Tyr Ile Ala Val Ile  Leu Glu Asn
    1775                1780                1785

Phe Ser  Val Ala Thr Glu Glu  Ser Ala Glu Pro Leu  Ser Glu Asp
    1790                1795                1800

Asp Phe  Glu Met Phe Tyr Glu  Val Trp Glu Lys Phe  Asp Pro Asp
    1805                1810                1815

Ala Thr  Gln Phe Met Glu Phe  Glu Lys Leu Ser Gln  Phe Ala Ala
    1820                1825                1830

Ala Leu  Glu Pro Pro Leu Asn  Leu Pro Gln Pro Asn  Lys Leu Gln
    1835                1840                1845

Leu Ile  Ala Met Asp Leu Pro  Met Val Ser Gly Asp  Arg Ile His
    1850                1855                1860

Cys Leu  Asp Ile Leu Phe Ala  Phe Thr Lys Arg Val  Leu Gly Glu
    1865                1870                1875

Ser Gly  Glu Met Asp Ala Leu  Arg Ile Gln Met Glu  Glu Arg Phe
    1880                1885                1890

Met Ala  Ser Asn Pro Ser Lys  Val Ser Tyr Gln Pro  Ile Thr Thr
    1895                1900                1905

Thr Leu  Lys Arg Lys Gln Glu  Glu Val Ser Ala Val  Ile Ile Gln
    1910                1915                1920
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SSCP Update Sequences.ST25

Arg Ala Tyr Arg Arg His Leu Leu Lys Arg Thr Val Lys Gln Ala
    1925   1930   1935

Ser Phe Thr Tyr Asn Lys Asn Lys Ile Lys Gly Gly Ala Asn Leu
    1940   1945   1950

Leu Ile Lys Glu Asp Met Ile Ile Asp Arg Ile Asn Glu Asn Ser
    1955   1960   1965

Ile Thr Glu Lys Thr Asp Leu Thr Met Ser Thr Ala Ala Cys Pro
    1970   1975   1980

Pro Ser Tyr Asp Arg Val Thr Lys Pro Ile Val Glu Lys His Glu
    1985   1990   1995

Gln Glu Gly Lys Asp Glu Lys Ala Lys Gly Lys
    2000   2005

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<211>   1406
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<213>   Homo sapiens

<400>   79

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   ·   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
                85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
        115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
    130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr

SSCP Update Sequences.ST25

145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
                165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
        195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
    210   215   220

Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225   230   235   240

Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
                245   250   255

Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
            260   265   270

Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
        275   280   285

Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
    290   295   300

Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305   310   315   320

Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
                325   330   335

Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
            340   345   350

Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
        355   360   365

Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
    370   375   380

Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr Tyr Met
385   390   395   400

Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Ile Asn
                405   410   415

Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
                          Page 156

SSCP Update Sequences.ST25
          420   425   430

Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
        435   440   445

Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Gln Ala Ala Thr Ala
    450   455   460

Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465   470   475   480

Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
            485   490   495

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
            500   505   510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
        515   520   525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
    530   535   540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545   550   555   560

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
            565   570   575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
            580   585   590

Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
        595   600   605

Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
    610   615   620

Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625   630   635   640

Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
            645   650   655

Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
            660   665   670

Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
        675   680   685

Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu
                        Page 157

SSCP Update Sequences.ST25
690   695   700

Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705   710   715   720

Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
                725   730   735

Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
            740   745   750

Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
        755   760   765

Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
    770   775   780

Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785   790   795   800

Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
            805   810   815

Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
            820   825   830

Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
        835   840   845

Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
    850   855   860

Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865   870   875   880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
            885   890   895

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
            900   905   910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
    915   920   925

Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930   935   940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945   950   955   960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
                            Page 158

SSCP Update Sequences.ST25
            965   970   975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
            980   985   990

Ser Ser Phe Ser Ala Asp Asn Leu Ala Ala Thr Asp Asp Asp Asn Glu
            995   1000   1005

Met Asn Asn Leu Gln Ile Ala Val Asp Arg Met His Lys Gly Val
    1010   1015   1020

Ala Tyr Val Lys Arg Lys Ile Tyr Glu Phe Ile Gln Gln Ser Phe
    1025   1030   1035

Ile Arg Lys Gln Lys Ile Leu Asp Glu Ile Lys Pro Leu Asp Asp
    1040   1045   1050

Leu Asn Asn Lys Lys Asp Ser Cys Met Ser Asn His Thr Thr Glu
    1055   1060   1065

Ile Gly Lys Asp Leu Asp Tyr Leu Lys Asp Val Asn Gly Thr Thr
    1070   1075   1080

Ser Gly Ile Gly Thr Gly Ser Ser Val Glu Lys Tyr Ile Ile Asp
    1085   . 1090   1095

Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn Pro Ser Leu Thr Val
    1100   1105   1110

Thr Val Pro Ile Ala Val Gly Glu Ser Asp Phe Glu Asn Leu Asn
    1115   1120   1125

Thr Glu Asp Phe Ser Ser Glu Ser Asp Leu Glu Glu Ser Lys Glu
    1130   1135   1140

Lys Leu Asn Glu Ser Ser Ser Ser Ser Glu Gly Ser Thr Val Asp
    1145   1150   1155

Ile Gly Ala Pro Val Glu Glu Gln Pro Val Val Glu Pro Glu Glu
    1160   1165   1170

Thr Leu Glu Pro Glu Ala Cys Phe Thr Glu Gly Cys Val Gln Arg
    1175   1180   1185

Phe Lys Cys Cys Gln Ile Asn Val Glu Glu Gly Arg Gly Lys Gln
    1190   1195   1200

Trp Trp Asn Leu Arg Arg Thr Cys Phe Arg Ile Val Glu His Asn
    1205   1210   1215

Trp Phe Glu Thr Phe Ile Val Phe Met Ile Leu Leu Ser Ser Gly
                              Page 159

SSCP Update Sequences.ST25
1220   1225   1230

Ala Leu Ala Phe Glu Asp Ile Tyr Ile Asp Gln Arg Lys Thr Ile
    1235   1240   1245

Lys Thr Met Leu Glu Tyr Ala Asp Lys Val Phe Thr Tyr Ile Phe
    1250   1255   1260

Ile Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Tyr Gln Thr
    1265   1270   1275

Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp
    1280   1285   1290

Val Ser Leu Val Ser Leu Thr Ala Asn Ala Leu Gly Tyr Ser Glu
    1295   1300   1305

Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro
    1310   1315   1320

Leu Arg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Val Asn
    1325   1330   1335

Ala Leu Leu Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val
    1340   1345   1350

Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu
    1355   1360   1365

Phe Ala Gly Lys Phe Tyr His Cys Ile Asn Thr Thr Thr Gly Asp
    1370   1375   1380

Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
    1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala
    1400   1405

<210>   80
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<213>   Homo sapiens

<400>   80

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Asp Glu Asn Gly
        35   40   45

SSCP Update Sequences.ST25

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
            85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
        115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
    130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
            165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
            180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
        195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
    210   215   220

Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225   230   235   240

Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
            245   250   255

Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
            260   265   270

Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
        275   280   285

Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
    290   295   300

Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305   310   315   320

SSCP Update Sequences.ST25

Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
            325   330   335

Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
            340   345   350

Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
            355   360   365

Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
    370   375   380

Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr Tyr Met
385   390   395   400

Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Ile Asn
            405   410   415

Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
            420   425   430

Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
            435   440   445

Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Gln Ala Ala Thr Ala
    450   455   460

Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465   470   475   480

Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
            485   490   495

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
            500   505   510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
            515   520   525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
    530   535   540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545   550   555   560

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
            565   570   575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
            580   585   590

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```
Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
        595             600             605
```

```
Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
    610             615             620
```

```
Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625             630             635             640
```

```
Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
            645             650             655
```

```
Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
        660             665             670
```

```
Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
        675             680             685
```

```
Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu
    690             695             700
```

```
Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705             710             715             720
```

```
Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
            725             730             735
```

```
Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
        740             745             750
```

```
Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
        755             760             765
```

```
Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
770             775             780
```

```
Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785             790             795             800
```

```
Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
            805             810             815
```

```
Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
            820             825             830
```

```
Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
        835             840             845
```

```
Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
850             855             860
```

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Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865   870   875   880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
                885   890   895

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
            900   905   910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
        915   920   925

Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930   935   940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945   950   955   960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
            965   970   975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
            980   985   990

Ser Ser Phe Ser Ala Asp Asn Leu Ala Ala Thr Asp Asp Asp Asn Glu
        995   1000   1005

Met Asn Asn Leu Gln Ile Ala Val Asp Arg Met His Lys Gly Val
    1010   1015   1020

Ala Tyr Val Lys Arg Lys Ile Tyr Glu Phe Ile Gln Gln Ser Phe
    1025   1030   1035

Ile Arg Lys Gln Lys Ile Leu Asp Glu Ile Lys Pro Leu Asp Asp
    1040   1045   1050

Leu Asn Asn Lys Lys Asp Ser Cys Met Ser Asn His Thr Thr Glu
    1055   1060   1065

Ile Gly Lys Asp Leu Asp Tyr Leu Lys Asp Val Asn Gly Thr Thr
    1070   1075   1080

Ser Gly Ile Gly Thr Gly Ser Ser Val Glu Lys Tyr Ile Ile Asp
    1085   1090   1095

Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn Pro Ser Leu Thr Val
    1100   1105   1110

Thr Val Pro Ile Ala Val Gly Glu Ser Asp Phe Glu Asn Leu Asn
    1115   1120   1125

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```
Thr Glu  Asp Phe Ser Ser Glu  Ser Asp Leu Glu Glu  Ser Lys Glu
    1130                 1135                 1140

Lys Leu  Asn Glu Ser Ser Ser  Ser Ser Glu Gly Ser  Thr Val Asp
    1145                 1150                 1155

Ile Gly  Ala Pro Val Glu Glu  Gln Pro Val Val Glu  Pro Glu Glu
    1160                 1165                 1170

Thr Leu  Glu Pro Glu Ala Cys  Phe Thr Glu Gly Cys  Val Gln Arg
    1175                 1180                 1185

Phe Lys  Cys Cys Gln Ile Asn  Val Glu Glu Gly Arg  Gly Lys Gln
    1190                 1195                 1200

Trp Trp  Asn Leu Arg Arg Thr  Cys Phe Arg Ile Val  Glu His Asn
    1205                 1210                 1215

Trp Phe  Glu Thr Phe Ile Val  Phe Met Ile Leu Leu  Ser Ser Gly
    1220                 1225                 1230

Ala Leu  Ala Phe Glu Asp Ile  Tyr Ile Asp Gln Arg  Lys Thr Ile
    1235                 1240                 1245

Lys Thr  Met Leu Glu Tyr Ala  Asp Lys Val Phe Thr  Tyr Ile Phe
    1250                 1255                 1260

Ile Leu  Glu Met Leu Leu Lys  Trp Val Ala Tyr Gly  Tyr Gln Thr
    1265                 1270                 1275

Tyr Phe  Thr Asn Ala Trp Cys  Trp Leu Asp Phe Leu  Ile Val Asp
    1280                 1285                 1290

Val Ser  Leu Val Ser Leu Thr  Ala Asn Ala Leu Gly  Tyr Ser Glu
    1295                 1300                 1305

Leu Gly  Ala Ile Lys Ser Leu  Arg Thr Leu Arg Ala  Leu Arg Pro
    1310                 1315                 1320

Leu Arg  Ala Leu Ser Arg Phe  Glu Gly Met Arg Val  Val Val Asn
    1325                 1330                 1335

Ala Leu  Leu Gly Ala Ile Pro  Ser Ile Met Asn Val  Leu Leu Val
    1340                 1345                 1350

Cys Leu  Ile Phe Trp Leu Ile  Phe Ser Ile Met Gly  Val Asn Leu
    1355                 1360                 1365

Phe Ala  Gly Lys Phe Tyr His  Cys Ile Asn Thr Thr  Thr Gly Asp
    1370                 1375                 1380
```

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Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
    1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala Arg Trp Lys Asn Val Lys Val
    1400   1405   1410

Asn Phe Asp Asn Val Gly Phe Gly Tyr Leu Ser Leu Leu Gln Val
    1415   1420   1425

Ala Thr Phe Lys Gly Trp Met Asp Ile Met Tyr Ala Ala Val Asp
    1430   1435   1440

Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr Glu Lys Ser Leu Tyr
    1445   1450   1455

Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile Phe Gly Ser Phe Phe
    1460   1465   1470

Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn Phe Asn Gln
    1475   1480   1485

Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile Phe Met Thr Glu Glu
    1490   1495   1500

Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys Lys
    1505   1510   1515

Pro Gln Lys Pro Ile Pro Arg Pro Gly Asn Lys Phe Gln Gly Met
    1520   1525   1530

Val Phe Asp Phe Val Thr Arg Gln Val Phe Asp Ile Ser Ile Met
    1535   1540   1545

Ile Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp
    1550   1555   1560

Asp Gln Ser Glu Tyr Val Thr Thr Ile Leu Ser Arg Ile Asn Leu
    1565   1570   1575

Val Phe Ile Val Leu Phe Thr Gly Glu Cys Val Leu Lys Leu Ile
    1580   1585   1590

Ser Leu Arg His Tyr Tyr Phe Thr Ile Gly Trp Asn Ile Phe Asp
    1595   1600   1605

Phe Val Val Val Ile Leu Ser Ile Val Gly Met Phe Leu Ala Glu
    1610   1615   1620

Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr Leu Phe Arg Val Ile
    1625   1630   1635

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Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg Leu Ile Lys Gly Ala
    1640   1645   1650

Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu Met Met Ser Leu Pro
    1655   1660   1665

Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe Leu Val Met Phe Ile
    1670   1675   1680

Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala Tyr Val Lys Arg Glu
    1685   1690   1695

Val Gly Ile Asp Asp Met Phe Asn Phe Glu Thr Phe Gly Asn Ser
    1700   1705   1710

Met Ile Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly Trp Asp Gly
    1715   1720   1725

Leu Leu Ala Pro Ile Leu Asn Ser Lys Pro Pro Asp Cys Asp Pro
    1730   1735   1740

Asn Lys Val Asn Pro Gly Ser Ser Val Lys Gly Asp Cys Gly Asn
    1745   1750   1755

Pro Ser Val Gly Ile Phe Phe Phe Val Ser Tyr Ile Ile Ile Ser
    1760   1765   1770

Phe Leu Val Val Val Asn Thr Tyr Ile Ala Val Ile Leu Glu Asn
    1775   1780   1785

Phe Ser Val Ala Thr Glu Glu Ser Ala Glu Pro Leu Ser Glu Asp
    1790   1795   1800

Asp Phe Glu Met Phe Tyr Glu Val Trp Glu Lys Phe Asp Pro Asp
    1805   1810   1815

Ala Thr Gln Phe Met Glu Phe Glu Lys Leu Ser Gln Phe Ala Ala
    1820   1825   1830

Ala Leu Glu Pro Pro Leu Asn Leu Pro Gln Pro Asn Lys Leu Gln
    1835   1840   1845

Leu Ile Ala Met Asp Leu Pro Met Val Ser Gly Asp Arg Ile His
    1850   1855   1860

Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys Arg Val Leu Gly Glu
    1865   1870   1875

Ser Gly Glu Met Asp Ala Leu Arg Ile Gln Met Glu Glu Arg Phe
    1880   1885   1890

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Met Ala Ser Asn Pro Ser Lys Val Ser Tyr Gln Pro Ile Thr Thr
    1895   1900   1905

Thr Leu Lys Arg Lys Gln Glu Glu Val Ser Ala Val Ile Ile Gln
    1910   1915   1920

Arg Ala Tyr Arg Arg His Leu Leu Lys Arg Thr Val Lys Gln Ala
    1925   1930   1935

Ser Phe Thr Tyr Asn Lys Asn Lys Ile Lys Gly Gly Ala Asn Leu
    1940   1945   1950

Leu Ile Lys Glu Asp Met Ile Ile Asp Arg Ile Asn Glu Asn Ser
    1955   1960   1965

Ile Thr Glu Lys Thr Asp Leu Thr Met Ser Thr Ala Ala Cys Pro
    1970   1975   1980

Pro Ser Tyr Asp Arg Val Thr Lys Pro Ile Val Glu Lys His Glu
    1985   1990   1995

Gln Glu Gly Lys Asp Glu Lys Ala Lys Gly Lys
    2000   2005

<210> 81
<211> 1891
<212> PRT
<213> Homo sapiens

<400> 81

Met Glu Gln Thr Val Leu Val Pro Pro Gly Pro Asp Ser Phe Asn Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Arg Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Asn Pro Lys Pro Asp Lys Lys Asp Asp Glu Asn Gly
        35   40   45

Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Asn Leu Pro Phe Ile
    50   55   60

Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Glu Pro Leu Glu Asp Leu
65   70   75   80

Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys Leu
            85   90   95

Lys Ala Ile Phe Arg Phe Ser Ala Thr Ser Ala Leu Tyr Ile Leu Thr
            100   105   110

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Pro Phe Asn Pro Leu Arg Lys Ile Ala Ile Lys Ile Leu Val His Ser
     115   120   125

Leu Phe Ser Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val Phe
   130   135   140

Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr Thr
145   150   155   160

Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Ile Ala Arg
        165   170   175

Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn Trp
     180   185   190

Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val Asp
     195   200   205

Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala Leu
   210   215   220

Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala Leu
225   230   235   240

Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val Phe
        245   250   255

Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly Asn
     260   265   270

Leu Arg Asn Lys Cys Ile Gln Trp Pro Pro Thr Asn Ala Ser Leu Glu
     275   280   285

Glu His Ser Ile Glu Lys Asn Ile Thr Val Asn Tyr Asn Gly Thr Leu
   290   295   300

Ile Asn Glu Thr Val Phe Glu Phe Asp Trp Lys Ser Tyr Ile Gln Asp
305   310   315   320

Ser Arg Tyr His Tyr Phe Leu Glu Gly Phe Leu Asp Ala Leu Leu Cys
        325   330   335

Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Met Cys Val
     340   345   350

Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp Thr Phe
     355   360   365

Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp Phe Trp
   370   375   380

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Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr Tyr Met
385   390   395   400

Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Ile Asn
                405   410   415

Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn Gln Ala
                420   425   430

Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln Met Ile
        435   440   445

Glu Gln Leu Lys Lys Gln Gln Glu Ala Ala Gln Gln Ala Ala Thr Ala
        450   455   460

Thr Ala Ser Glu His Ser Arg Glu Pro Ser Ala Ala Gly Arg Leu Ser
465   470   475   480

Asp Ser Ser Ser Glu Ala Ser Lys Leu Ser Ser Lys Ser Ala Lys Glu
                485   490   495

Arg Arg Asn Arg Arg Lys Lys Arg Lys Gln Lys Glu Gln Ser Gly Gly
                500   505   510

Glu Glu Lys Asp Glu Asp Glu Phe Gln Lys Ser Glu Ser Glu Asp Ser
        515   520   525

Ile Arg Arg Lys Gly Phe Arg Phe Ser Ile Glu Gly Asn Arg Leu Thr
        530   535   540

Tyr Glu Lys Arg Tyr Ser Ser Pro His Gln Ser Leu Leu Ser Ile Arg
545   550   555   560

Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Thr Ser Leu Phe Ser
                565   570   575

Phe Arg Gly Arg Ala Lys Asp Val Gly Ser Glu Asn Asp Phe Ala Asp
                580   585   590

Asp Glu His Ser Thr Phe Glu Asp Asn Glu Ser Arg Arg Asp Ser Leu
        595   600   605

Phe Val Pro Arg Arg His Gly Glu Arg Arg Asn Ser Asn Leu Ser Gln
        610   615   620

Thr Ser Arg Ser Ser Arg Met Leu Ala Val Phe Pro Ala Asn Gly Lys
625   630   635   640

Met His Ser Thr Val Asp Cys Asn Gly Val Val Ser Leu Val Gly Gly
                645   650   655

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Pro Ser Val Pro Thr Ser Pro Val Gly Gln Leu Leu Pro Glu Val Ile
            660   665   670

Ile Asp Lys Pro Ala Thr Asp Asp Asn Gly Thr Thr Thr Glu Thr Glu
        675   680   685

Met Arg Lys Arg Arg Ser Ser Ser Phe His Val Ser Met Asp Phe Leu
    690   695   700

Glu Asp Pro Ser Gln Arg Gln Arg Ala Met Ser Ile Ala Ser Ile Leu
705   710   715   720

Thr Asn Thr Val Glu Glu Leu Glu Glu Ser Arg Gln Lys Cys Pro Pro
                725   730   735

Cys Trp Tyr Lys Phe Ser Asn Ile Phe Leu Ile Trp Asp Cys Ser Pro
            740   745   750

Tyr Trp Leu Lys Val Lys His Val Val Asn Leu Val Val Met Asp Pro
        755   760   765

Phe Val Asp Leu Ala Ile Thr Ile Cys Ile Val Leu Asn Thr Leu Phe
    770   775   780

Met Ala Met Glu His Tyr Pro Met Thr Asp His Phe Asn Asn Val Leu
785   790   795   800

Thr Val Gly Asn Leu Val Phe Thr Gly Ile Phe Thr Ala Glu Met Phe
            805   810   815

Leu Lys Ile Ile Ala Met Asp Pro Tyr Tyr Tyr Phe Gln Glu Gly Trp
        820   825   830

Asn Ile Phe Asp Gly Phe Ile Val Thr Leu Ser Leu Val Glu Leu Gly
        835   840   845

Leu Ala Asn Val Glu Gly Leu Ser Val Leu Arg Ser Phe Arg Leu Leu
    850   855   860

Arg Val Phe Lys Leu Ala Lys Ser Trp Pro Thr Leu Asn Met Leu Ile
865   870   875   880

Lys Ile Ile Gly Asn Ser Val Gly Ala Leu Gly Asn Leu Thr Leu Val
            885   890   895

Leu Ala Ile Ile Val Phe Ile Phe Ala Val Val Gly Met Gln Leu Phe
        900   905   910

Gly Lys Ser Tyr Lys Asp Cys Val Cys Lys Ile Ala Ser Asp Cys Gln
    915   920   925

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Leu Pro Arg Trp His Met Asn Asp Phe Phe His Ser Phe Leu Ile Val
    930   935   940

Phe Arg Val Leu Cys Gly Glu Trp Ile Glu Thr Met Trp Asp Cys Met
945   950   955   960

Glu Val Ala Gly Gln Ala Met Cys Leu Thr Val Phe Met Met Val Met
            965   970   975

Val Ile Gly Asn Leu Val Val Leu Asn Leu Phe Leu Ala Leu Leu Leu
            980   985   990

Ser Ser Phe Ser Ala Asp Asn Leu Ala Ala Thr Asp Asp Asp Asn Glu
        995   1000   1005

Met Asn Asn Leu Gln Ile Ala Val Asp Arg Met His Lys Gly Val
    1010   1015   1020

Ala Tyr Val Lys Arg Lys Ile Tyr Glu Phe Ile Gln Gln Ser Phe
    1025   1030   1035

Ile Arg Lys Gln Lys Ile Leu Asp Glu Ile Lys Pro Leu Asp Asp
    1040   1045   1050

Leu Asn Asn Lys Lys Asp Ser Cys Met Ser Asn His Thr Thr Glu
    1055   1060   1065

Ile Gly Lys Asp Leu Asp Tyr Leu Lys Asp Val Asn Gly Thr Thr
    1070   1075   1080

Ser Gly Ile Gly Thr Gly Ser Ser Val Glu Lys Tyr Ile Ile Asp
    1085   1090   1095

Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn Pro Ser Leu Thr Val
    1100   1105   1110

Thr Val Pro Ile Ala Val Gly Glu Ser Asp Phe Glu Asn Leu Asn
    1115   1120   1125

Thr Glu Asp Phe Ser Ser Glu Ser Asp Leu Glu Glu Ser Lys Glu
    1130   1135   1140

Lys Leu Asn Glu Ser Ser Ser Ser Ser Glu Gly Ser Thr Val Asp
    1145   1150   1155

Ile Gly Ala Pro Val Glu Glu Gln Pro Val Val Glu Pro Glu Glu
    1160   1165   1170

Thr Leu Glu Pro Glu Ala Cys Phe Thr Glu Gly Cys Val Gln Arg
    1175   1180   1185

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Phe Lys Cys Cys Gln Ile Asn Val Glu Glu Gly Arg Gly Lys Gln
    1190   1195   1200

Trp Trp Asn Leu Arg Arg Thr Cys Phe Arg Ile Val Glu His Asn
    1205   1210   1215

Trp Phe Glu Thr Phe Ile Val Phe Met Ile Leu Leu Ser Ser Gly
    1220   1225   1230

Ala Leu Ala Phe Glu Asp Ile Tyr Ile Asp Gln Arg Lys Thr Ile
    1235   1240   1245

Lys Thr Met Leu Glu Tyr Ala Asp Lys Val Phe Thr Tyr Ile Phe
    1250   1255   1260

Ile Leu Glu Met Leu Leu Lys Trp Val Ala Tyr Gly Tyr Gln Thr
    1265   1270   1275

Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp Phe Leu Ile Val Asp
    1280   1285   1290

Val Ser Leu Val Ser Leu Thr Ala Asn Ala Leu Gly Tyr Ser Glu
    1295   1300   1305

Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu Arg Ala Leu Arg Pro
    1310   1315   1320

Leu Arg Ala Leu Ser Arg Phe Glu Gly Met Arg Val Val Val Asn
    1325   1330   1335

Ala Leu Leu Gly Ala Ile Pro Ser Ile Met Asn Val Leu Leu Val
    1340   1345   1350

Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile Met Gly Val Asn Leu
    1355   1360   1365

Phe Ala Gly Lys Phe Tyr His Cys Ile Asn Thr Thr Thr Gly Asp
    1370   1375   1380

Arg Phe Asp Ile Glu Asp Val Asn Asn His Thr Asp Cys Leu Lys
    1385   1390   1395

Leu Ile Glu Arg Asn Glu Thr Ala Arg Trp Lys Asn Val Lys Val
    1400   1405   1410

Asn Phe Asp Asn Val Gly Phe Gly Tyr Leu Ser Leu Leu Gln Val
    1415   1420   1425

Ala Thr Phe Lys Gly Trp Met Asp Ile Met Tyr Ala Ala Val Asp
    1430   1435   1440

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Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr Glu Lys Ser Leu Tyr
    1445   1450   1455

Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile Phe Gly Ser Phe Phe
    1460   1465   1470

Thr Leu Asn Leu Phe Ile Gly Val Ile Ile Asp Asn Phe Asn Gln
    1475   1480   1485

Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile Phe Met Thr Glu Glu
    1490   1495   1500

Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys Leu Gly Ser Lys Lys
    1505   1510   1515

Pro Gln Lys Pro Ile Pro Arg Pro Gly Asn Lys Phe Gln Gly Met
    1520   1525   1530

Val Phe Asp Phe Val Thr Arg Gln Val Phe Asp Ile Ser Ile Met
    1535   1540   1545

Ile Leu Ile Cys Leu Asn Met Val Thr Met Met Val Glu Thr Asp
    1550   1555   1560

Asp Gln Ser Glu Tyr Val Thr Thr Ile Leu Ser Arg Ile Asn Leu
    1565   1570   1575

Val Phe Ile Val Leu Phe Thr Gly Glu Cys Val Leu Lys Leu Ile
    1580   1585   1590

Ser Leu Arg His Tyr Tyr Phe Thr Ile Gly Trp Asn Ile Phe Asp
    1595   1600   1605

Phe Val Val Val Ile Leu Ser Ile Val Gly Met Phe Leu Ala Glu
    1610   1615   1620

Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr Leu Phe Arg Val Ile
    1625   1630   1635

Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg Leu Ile Lys Gly Ala
    1640   1645   1650

Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu Met Met Ser Leu Pro
    1655   1660   1665

Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe Leu Val Met Phe Ile
    1670   1675   1680

Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala Tyr Val Lys Arg Glu
    1685   1690   1695

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Val Gly Ile Asp Asp Met Phe Asn Phe Glu Thr Phe Gly Asn Ser
    1700   1705   1710

Met Ile Cys Leu Phe Gln Ile Thr Thr Ser Ala Gly Trp Asp Gly
    1715   1720   1725

Leu Leu Ala Pro Ile Leu Asn Ser Lys Pro Pro Asp Cys Asp Pro
    1730   1735   1740

Asn Lys Val Asn Pro Gly Ser Ser Val Lys Gly Asp Cys Gly Asn
    1745   1750   1755

Pro Ser Val Gly Ile Phe Phe Phe Val Ser Tyr Ile Ile Ile Ser
    1760   1765   1770

Phe Leu Val Val Val Asn Met Tyr Ile Ala Val Ile Leu Glu Asn
    1775   1780   1785

Phe Ser Val Ala Thr Glu Glu Ser Ala Glu Pro Leu Ser Glu Asp
    1790   1795   1800

Asp Phe Glu Met Phe Tyr Glu Val Trp Glu Lys Phe Asp Pro Asp
    1805   1810   1815

Ala Thr Gln Phe Met Glu Phe Glu Lys Leu Ser Gln Phe Ala Ala
    1820   1825   1830

Ala Leu Glu Pro Pro Leu Asn Leu Pro Gln Pro Asn Lys Leu Gln
    1835   1840   1845

Leu Ile Ala Met Asp Leu Pro Met Val Ser Gly Asp Arg Ile His
    1850   1855   1860

Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys Arg Val Leu Gly Glu
    1865   1870   1875

Ser Gly Glu Met Asp Ala Leu Arg Ile Gln Met Glu Glu
    1880   1885   1890

<210>   82
<211>   218
<212>   PRT
<213>   Homo sapiens

<400>   82

Met Gly Arg Leu Leu Ala Leu Val Val Gly Ala Ala Leu Val Ser Ser
1   5   10   15

Ala Cys Gly Gly Cys Val Glu Val Asp Ser Glu Thr Glu Ala Val Tyr
             20   25   30

SSCP Update Sequences.ST25

```
Gly Met Thr Phe Lys Ile Leu Cys Ile Ser Cys Lys Arg Arg Ser Glu
        35                  40              45

Thr Asn Ala Glu Thr Phe Thr Glu Trp Thr Phe Arg Gln Lys Gly Thr
    50              55              60

Glu Glu Phe Val Lys Ile Leu Arg Tyr Glu Asn Glu Val Leu Gln Leu
65              70              75                  80

Glu Glu Asp Glu His Phe Glu Gly Arg Val Val Trp Asn Gly Ser Arg
.               85              90                  95

Gly Thr Lys Asp Leu Gln Asp Leu Ser Ile Phe Ile Thr Asn Val Thr
            100             105             110

Tyr Asn His Ser Gly Asp Tyr Glu Cys His Val Tyr Arg Leu Leu Phe
        115             120             125

Phe Glu Asn Tyr Glu His Asn Thr Ser Val Val Lys Lys Ile His Ile
  130             135             140

Glu Val Val Asp Lys Ala Asn Arg Asp Met Ala Ser Ile Val Ser Glu
145             150             155             160

Ile Met Met Tyr Val Leu Ile Val Val Leu Thr Ile Trp Leu Val Ala
            165             170             175

Glu Met Ile Tyr Cys Tyr Lys Lys Ile Ala Ala Ala Thr Glu Thr Ala
            180             185             190

Ala Gln Glu Asn Ala Ser Glu Tyr Leu Ala Ile Thr Ser Glu Ser Lys
        195             200             205

Glu Asn Cys Thr Gly Val Gln Val Ala Glu
    210             215
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<210> 83
<211> 2005
<212> PRT
<213> Homo sapiens

<400> 83

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Met Ala Gln Ser Val Leu Val Pro Pro Gly Pro Asp Ser Phe Arg Phe
1               5               10              15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Gln Arg Ile Ala Glu Glu
            20              25              30

Lys Ala Lys Arg Pro Lys Gln Glu Arg Lys Asp Glu Asp Asp Glu Asn
        35              40              45

Gly Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Ser Leu Pro Phe
```

SSCP Update Sequences.ST25
      50   55   60

Ile Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Val Pro Leu Glu Asp
65   70   75   80

Leu Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys
            85   90   95

Gly Lys Ala Ile Ser Arg Phe Ser Ala Thr Pro Ala Leu Tyr Ile Leu
            100   105   110

Thr Pro Phe Asn Pro Ile Arg Lys Leu Ala Ile Lys Ile Leu Val His
        115   120   125

Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val
    130   135   140

Phe Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr
145   150   155   160

Thr Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Leu Ala
            165   170   175

Arg Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn
            180   185   190

Trp Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val
        195   200   205

Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Gln Ala
    210   215   220

Leu Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala
225   230   235   240

Leu Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val
            245   250   255

Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly
            260   265   270

Asn Leu Arg Asn Lys Cys Leu Gln Trp Pro Pro Asp Asn Ser Ser Phe
        275   280   285

Glu Ile Asn Ile Thr Ser Phe Phe Asn Asn Ser Leu Asp Gly Asn Gly
    290   295   300

Thr Thr Phe Asn Arg Thr Val Ser Ile Phe Asn Trp Asp Glu Tyr Ile
305   310   315   320

Glu Asp Lys Ser His Phe Tyr Phe Leu Glu Gly Gln Asn Asp Ala Leu
                          Page 177

SSCP Update Sequences.ST25
325   330   335

Leu Cys Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Ile
            340   345   350

Cys Val Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp
            355   360   365

Thr Phe Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp
370   375   380

Phe Trp Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr
385   390   395   400

Tyr Met Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu
            405   410   415

Ile Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn
            420   425   430

Gln Ala Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln
            435   440   445

Met Leu Glu Gln Leu Lys Lys Gln Gln Glu Glu Ala Gln Ala Ala Ala
    450   455   460

Ala Ala Ala Ser Ala Glu Ser Arg Asp Phe Ser Gly Ala Gly Gly Ile
465   470   475   480

Gly Val Phe Ser Glu Ser Ser Ser Val Ala Ser Lys Leu Ser Ser Lys
            485   490   495

Ser Glu Lys Glu Leu Lys Asn Arg Arg Lys Lys Lys Lys Gln Lys Glu
            500   505   510

Gln Ser Gly Glu Glu Glu Lys Asn Asp Arg Val Leu Lys Ser Glu Ser
            515   520   525

Glu Asp Ser Ile Arg Arg Lys Gly Phe Arg Phe Ser Leu Glu Gly Ser
    530   535   540

Arg Leu Thr Tyr Glu Lys Arg Phe Ser Ser Pro His Gln Ser Leu Leu
545   550   555   560

Ser Ile Arg Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Ala Ser
            565   570   575

Leu Phe Ser Phe Arg Gly Arg Ala Lys Asp Ile Gly Ser Glu Asn Asp
            580   585   590

Phe Ala Asp Asp Glu His Ser Thr Phe Glu Asp Asn Asp Ser Arg Arg
                            Page 178

SSCP Update Sequences.ST25
        595   600   605

Asp Ser Leu Phe Val Pro His Arg His Gly Glu Arg Arg His Ser Asn
    610   615   620

Val Ser Gln Ala Ser Arg Ala Ser Arg Val Leu Pro Ile Leu Pro Met
625   630   635   640

Asn Gly Lys Met His Ser Ala Val Asp Cys Asn Gly Val Val Ser Leu
                645   650   655

Val Gly Gly Pro Ser Thr Leu Thr Ser Ala Gly Gln Leu Leu Pro Glu
                660   665   670

Gly Thr Thr Thr Glu Thr Glu Ile Arg Lys Arg Arg Ser Ser Ser Tyr
                675   680   685

His Val Ser Met Asp Leu Leu Glu Asp Pro Thr Ser Arg Gln Arg Ala
    690   695   700

Met Ser Ile Ala Ser Ile Leu Thr Asn Thr Met Glu Glu Leu Glu Glu
705   710   715   720

Ser Arg Gln Lys Cys Pro Pro Cys Trp Tyr Lys Phe Ala Asn Met Cys
                725   730   735

Leu Ile Trp Asp Cys Cys Lys Pro Trp Leu Lys Val Lys His Leu Val
                740   745   750

Asn Leu Val Val Met Asp Pro Phe Val Asp Leu Ala Ile Thr Ile Cys
                755   760   765

Ile Val Leu Asn Thr Leu Phe Met Ala Met Glu His Tyr Pro Met Thr
    770   775   780

Glu Gln Phe Ser Ser Val Leu Ser Val Gly Asn Leu Val Phe Thr Gly
785   790   795   800

Ile Phe Thr Ala Glu Met Phe Leu Lys Ile Ile Ala Met Asp Pro Tyr
                805   810   815

Tyr Tyr Phe Gln Glu Gly Trp Asn Ile Phe Asp Gly Phe Ile Val Ser
                820   825   830

Leu Ser Leu Met Glu Leu Gly Leu Ala Asn Val Glu Gly Leu Ser Val
                835   840   845

Leu Arg Ser Phe Arg Leu Leu Arg Val Phe Lys Leu Ala Lys Ser Trp
    850   855   860

Pro Thr Leu Asn Met Leu Ile Lys Ile Ile Gly Asn Ser Val Gly Ala
                            Page 179

SSCP Update Sequences.ST25

865   870   875   880

Leu Gly Asn Leu Thr Leu Val Leu Ala Ile Ile Val Phe Ile Phe Ala
                    885   890   895

Val Val Gly Met Gln Leu Phe Gly Lys Ser Tyr Lys Glu Cys Val Cys
              900   905   910

Lys Ile Ser Asn Asp Cys Glu Leu Pro Arg Trp His Met His Asp Phe
          915   920   925

Phe His Ser Phe Leu Ile Val Phe Arg Val Leu Cys Gly Glu Trp Ile
    930   935   940

Glu Thr Met Trp Asp Cys Met Glu Val Ala Gly Gln Thr Met Cys Leu
945   950   955   960

Thr Val Phe Met Met Val Met Val Ile Gly Asn Leu Val Val Leu Asn
              965   970   975

Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ser Asp Asn Leu Ala
          980   985   990

Ala Thr Asp Asp Asp Asn Glu Met Asn Asn Leu Gln Ile Ala Val Gly
        995   1000   1005

Arg Met Gln Lys Gly Ile Asp Phe Val Lys Arg Lys Ile Arg Glu
    1010   1015   1020

Phe Ile Gln Lys Ala Phe Val Arg Lys Gln Lys Ala Leu Asp Glu
    1025   1030   1035

Ile Lys Pro Leu Glu Asp Leu Asn Asn Lys Lys Asp Ser Cys Ile
    1040   1045   1050

Ser Asn His Thr Thr Ile Glu Ile Gly Lys Asp Leu Asn Tyr Leu
    1055   1060   1065

Lys Asp Gly Asn Gly Thr Thr Ser Gly Ile Gly Ser Ser Val Glu
    1070   1075   1080

Lys Tyr Val Val Asp Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn
    1085   1090   1095

Pro Ser Leu Thr Val Thr Val Pro Ile Ala Val Gly Glu Ser Asp
    1100   1105   1110

Phe Glu Asn Leu Asn Thr Glu Glu Phe Ser Ser Glu Ser Asp Met
    1115   1120   1125

Glu Glu Ser Lys Glu Lys Leu Asn Ala Thr Ser Ser Ser Glu Gly
                         Page 180

SSCP Update Sequences.ST25

<pre>
        1130   1135   1140

Ser Thr Val Asp Ile Gly Ala Pro Ala Glu Gly Glu Gln Pro Glu
         1145   1150   1155

Val Glu Pro Glu Glu Ser Leu Glu Pro Glu Ala Cys Phe Thr Glu
         1160   1165   1170

Asp Cys Val Arg Lys Phe Lys Cys Cys Gln Ile Ser Ile Glu Glu
         1175   1180   1185

Gly Lys Gly Lys Leu Trp Trp Asn Leu Arg Lys Thr Cys Tyr Lys
         1190   1195   1200

Ile Val Glu His Asn Trp Phe Glu Thr Phe Ile Val Phe Met Ile
         1205   1210   1215

Leu Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Ile Glu
         1220   1225   1230

Gln Arg Lys Thr Ile Lys Thr Met Leu Glu Tyr Ala Asp Lys Val
         1235   1240   1245

Phe Thr Tyr Ile Phe Ile Leu Glu Met Leu Leu Lys Trp Val Ala
         1250   1255   1260

Tyr Gly Phe Gln Val Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp
         1265   1270   1275

Phe Leu Ile Val Asp Val Ser Leu Val Ser Leu Thr Ala Asn Ala
         1280   1285   1290

Leu Gly Tyr Ser Glu Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu
         1295   1300   1305

Arg Ala Leu Arg Pro Leu Arg Ala Leu Ser Arg Phe Glu Gly Met
         1310   1315   1320

Arg Val Val Val Asn Ala Leu Leu Gly Ala Ile Pro Ser Ile Met
         1325   1330   1335

Asn Val Leu Leu Val Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile
         1340   1345   1350

Met Gly Val Asn Leu Phe Ala Gly Lys Phe Tyr His Cys Ile Asn
         1355   1360   1365

Tyr Thr Thr Gly Glu Met Phe Asp Val Ser Val Val Asn Asn Tyr
         1370   1375   1380

Ser Glu Cys Lys Ala Leu Ile Glu Ser Asn Gln Thr Ala Arg Trp
</pre>

SSCP Update Sequences.ST25
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            1385                    1390                      1395


Lys Asn  Val Lys Val Asn  Phe  Asp Asn Val Gly  Leu  Gly Tyr Leu
        1400                   1405                  1410


Ser Leu  Leu Gln Val Ala  Thr  Phe Lys Gly Trp  Met  Asp Ile Met
        1415                   1420                  1425


Tyr Ala  Ala Val Asp Ser  Arg  Asn Val Glu Leu  Gln  Pro Lys Tyr
        1430                   1435                  1440


Glu Asp  Asn Leu Tyr Met  Tyr  Leu Tyr Phe Val  Ile  Phe Ile Ile
        1445                   1450                  1455


Phe Gly  Ser Phe Phe Thr  Leu  Asn Leu Phe Ile  Gly  Val Ile Ile
        1460                   1465                  1470


Asp Asn  Phe Asn Gln Gln  Lys  Lys Lys Phe Gly  Gly  Gln Asp Ile
        1475                   1480                  1485


Phe Met  Thr Glu Glu Gln  Lys  Lys Tyr Tyr Asn  Ala  Met Lys Lys
        1490                   1495                  1500


Leu Gly  Ser Lys Lys Pro  Gln  Lys Pro Ile Pro  Arg  Pro Ala Asn
        1505                   1510                  1515


Lys Phe  Gln Gly Met Val  Phe  Asp Phe Val Thr  Lys  Gln Val Phe
        1520                   1525                  1530


Asp Ile  Ser Ile Met Ile  Leu  Ile Cys Leu Asn  Met  Val Thr Met
        1535                   1540                  1545


Met Val  Glu Thr Asp Asp  Gln  Ser Gln Glu Met  Thr  Asn Ile Leu
        1550                   1555                  1560


Tyr Trp  Ile Asn Leu Val  Phe  Ile Val Leu Phe  Thr  Gly Glu Cys
        1565                   1570                  1575


Val Leu  Lys Leu Ile Ser  Leu  Arg Tyr Tyr Tyr  Phe  Thr Ile Gly
        1580                   1585                  1590


Trp Asn  Ile Phe Asp Phe  Val  Val Val Ile Leu  Ser  Ile Val Gly
        1595                   1600                  1605


Met Phe  Leu Ala Glu Leu  Ile  Glu Lys Tyr Phe  Val  Ser Pro Thr
        1610                   1615                  1620


Leu Phe  Arg Val Ile Arg  Leu  Ala Arg Ile Gly  Arg  Ile Leu Arg
        1625                   1630                  1635


Leu Ile  Lys Gly Ala Lys Gly  Ile Arg Thr Leu Leu  Phe Ala Leu
```

SSCP Update Sequences.ST25
      1640   1645   1650

Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe
    1655   1660   1665

Leu Val Met Phe Ile Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala
    1670   1675   1680

Tyr Val Lys Arg Glu Val Gly Ile Asp Asp Met Phe Asn Phe Glu
    1685   1690   1695

Thr Phe Gly Asn Ser Met Ile Cys Leu Phe Gln Ile Thr Thr Ser
    1700   1705   1710

Ala Gly Trp Asp Gly Leu Leu Ala Pro Ile Leu Asn Ser Gly Pro
    1715   1720   1725

Pro Asp Cys Asp Pro Asp Lys Asp His Pro Gly Ser Ser Val Lys
    1730   1735   1740

Gly Asp Cys Gly Asn Pro Ser Val Gly Ile Phe Phe Phe Val Ser
    1745   1750   1755

Tyr Ile Ile Ile Ser Phe Leu Val Val Leu Asn Met Tyr Ile Ala
    1760   1765   1770

Val Ile Leu Glu Asn Phe Ser Val Ala Thr Glu Glu Ser Ala Glu
    1775   1780   1785

Pro Leu Ser Glu Asp Asp Phe Glu Met Phe Tyr Glu Val Trp Glu
    1790   1795   1800

Lys Phe Asp Pro Asp Ala Thr Gln Phe Ile Glu Phe Ala Lys Leu
    1805   1810   1815

Ser Asp Phe Ala Asp Ala Leu Asp Pro Pro Leu Leu Ile Ala Lys
    1820   1825   1830

Pro Asn Lys Val Gln Leu Ile Ala Met Asp Leu Pro Met Val Ser
    1835   1840   1845

Gly Asp Arg Ile His Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys
    1850   1855   1860

Arg Val Leu Gly Glu Ser Gly Glu Met Asp Ala Leu Arg Ile Gln
    1865   1870   1875

Met Glu Glu Arg Phe Met Ala Ser Asn Pro Ser Lys Val Ser Tyr
    1880   1885   1890

Glu Pro Ile Thr Thr Thr Leu Lys Arg Lys Gln Glu Glu Val Ser
                            Page 183

SSCP Update Sequences.ST25

1895   1900   1905

Ala Ile Ile Ile Gln Arg Ala Tyr Arg Arg Tyr Leu Leu Lys Gln
    1910   1915   1920

Lys Val Lys Lys Val Ser Ser Ile Tyr Lys Lys Asp Lys Gly Lys
    1925   1930   1935

Glu Cys Asp Gly Thr Pro Ile Lys Glu Asp Thr Leu Ile Asp Lys
    1940   1945   1950

Leu Asn Glu Asn Ser Thr Pro Glu Lys Thr Asp Met Thr Pro Ser
    1955   1960   1965

Thr Thr Ser Pro Pro Ser Tyr Asp Ser Val Thr Lys Pro Glu Lys
    1970   1975   1980

Glu Lys Phe Glu Lys Asp Lys Ser Glu Lys Glu Asp Lys Gly Lys
    1985   1990   1995

Asp Ile Arg Glu Ser Lys Lys
    2000   2005

<210>   84
<211>   2005
<212>   PRT
<213>   Homo sapiens

<400>   84

Met Ala Gln Ser Val Leu Val Pro Pro Gly Pro Asp Ser Phe Arg Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Gln Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Arg Pro Lys Gln Glu Arg Lys Asp Glu Asp Asp Glu Asn
        35   40   45

Gly Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Ser Leu Pro Phe
    50   55   60

Ile Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Val Pro Leu Glu Asp
65   70   75   80

Leu Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys
                85   90   95

Gly Lys Ala Ile Ser Arg Phe Ser Ala Thr Pro Ala Leu Tyr Ile Leu
            100   105   110

Thr Pro Phe Asn Pro Ile Arg Lys Leu Ala Ile Lys Ile Leu Val His
        115   120   125

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SSCP Update Sequences.ST25

Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val
    130   135   140

Phe Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr
145   150   155   160

Thr Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Leu Ala
                165   170   175

Arg Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn
            180   185   190

Trp Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val
        195   200   205

Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala
    210   215   220

Leu Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala
225   230   235   240

Leu Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val
                245   250   255

Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly
            260   265   270

Asn Leu Arg Asn Lys Cys Leu Gln Trp Pro Pro Asp Asn Ser Ser Phe
        275   280   285

Glu Ile Asn Ile Thr Ser Phe Phe Asn Asn Ser Leu Asp Gly Asn Gly
    290   295   300

Thr Thr Phe Asn Arg Thr Val Ser Ile Phe Asn Trp Asp Glu Tyr Ile
305   310   315   320

Glu Asp Lys Ser His Phe Tyr Phe Leu Glu Gly Gln Asn Asp Ala Leu
                325   330   335

Leu Cys Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Ile
            340   345   350

Cys Val Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp
        355   360   365

Thr Phe Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp
    370   375   380

Phe Trp Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr
385   390   395   400

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SSCP Update Sequences.ST25

```
Tyr Met Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu
            405             410             415

Ile Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn
            420             425             430

Gln Ala Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln
            435             440             445

Met Leu Glu Gln Leu Lys Lys Gln Gln Glu Glu Ala Gln Ala Ala Ala
    450             455             460

Ala Ala Ala Ser Ala Glu Ser Arg Asp Phe Ser Gly Ala Gly Gly Ile
465             470             475             480

Gly Val Phe Ser Glu Ser Ser Ser Val Ala Ser Lys Leu Ser Ser Lys
            485             490             495

Ser Glu Lys Glu Leu Lys Asn Arg Arg Lys Lys Lys Lys Gln Lys Glu
            500             505             510

Gln Ser Gly Glu Glu Glu Lys Asn Asp Arg Val Leu Lys Ser Glu Ser
            515             520             525

Glu Asp Ser Ile Arg Arg Lys Gly Phe Arg Phe Ser Leu Glu Gly Ser
    530             535             540

Arg Leu Thr Tyr Glu Lys Arg Phe Ser Ser Pro His Gln Ser Leu Leu
545             550             555             560

Ser Ile Arg Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Ala Ser
            565             570             575

Leu Phe Ser Phe Arg Gly Arg Ala Lys Asp Ile Gly Ser Glu Asn Asp
            580             585             590

Phe Ala Asp Asp Glu His Ser Thr Phe Glu Asp Asn Asp Ser Arg Arg
            595             600             605

Asp Ser Leu Phe Val Pro His Arg His Gly Glu Arg Arg His Ser Asn
    610             615             620

Val Ser Gln Ala Ser Arg Ala Ser Arg Val Leu Pro Ile Leu Pro Met
625             630             635             640

Asn Gly Lys Met His Ser Ala Val Asp Cys Asn Gly Val Val Ser Leu
            645             650             655

Val Gly Gly Pro Ser Thr Leu Thr Ser Ala Gly Gln Leu Leu Pro Glu
            660             665             670
```

SSCP Update Sequences.ST25

Gly Thr Thr Thr Glu Thr Glu Ile Arg Lys Arg Arg Ser Ser Ser Tyr
        675   680   685

His Val Ser Met Asp Leu Leu Glu Asp Pro Thr Ser Arg Gln Arg Ala
    690   695   700

Met Ser Ile Ala Ser Ile Leu Thr Asn Thr Met Glu Glu Leu Glu Glu
705   710   715   720

Ser Arg Gln Lys Cys Pro Pro Cys Trp Tyr Lys Phe Ala Asn Met Cys
            725   730   735

Leu Ile Trp Asp Cys Cys Lys Pro Trp Leu Lys Val Lys His Leu Val
            740   745   750

Asn Leu Val Val Met Asp Pro Phe Val Asp Leu Ala Ile Thr Ile Cys
        755   760   765

Ile Val Leu Asn Thr Leu Phe Met Ala Met Glu His Tyr Pro Met Thr
    770   775   780

Glu Gln Phe Ser Ser Val Leu Ser Val Gly Asn Leu Val Phe Thr Gly
785   790   795   800

Ile Phe Thr Ala Glu Met Phe Leu Lys Ile Ile Ala Met Asp Pro Tyr
            805   810   815

Tyr Tyr Phe Gln Glu Gly Trp Asn Ile Phe Asp Gly Phe Ile Val Ser
            820   825   830

Leu Ser Leu Met Glu Leu Gly Leu Ala Asn Val Glu Gly Leu Ser Val
        835   840   845

Leu Arg Ser Phe Arg Leu Leu Arg Val Phe Lys Leu Ala Lys Ser Trp
    850   855   860

Pro Thr Leu Asn Met Leu Ile Lys Ile Ile Gly Asn Ser Val Gly Ala
865   870   875   880

Leu Gly Asn Leu Thr Leu Val Leu Ala Ile Ile Ile Phe Ile Phe Ala
            885   890   895

Val Val Gly Met Gln Leu Phe Gly Lys Ser Tyr Lys Glu Cys Val Cys
            900   905   910

Lys Ile Ser Asn Asp Cys Glu Leu Pro Arg Trp His Met His Asp Phe
    915   920   925

Phe His Ser Phe Leu Ile Val Phe Arg Val Leu Cys Gly Glu Trp Ile
    930   935   940

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SSCP Update Sequences.ST25

Glu Thr Met Trp Asp Cys Met Glu Val Ala Gly Gln Thr Met Cys Leu
945   950   955   960

Thr Val Phe Met Met Val Met Val Ile Gly Asn Leu Val Val Leu Asn
                965   970   975

Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ser Asp Asn Leu Ala
                980   985   990

Ala Thr Asp Asp Asp Asn Glu Met Asn Asn Leu Gln Ile Ala Val Gly
            995   1000   1005

Arg Met Gln Lys Gly Ile Asp Phe Val Lys Arg Lys Ile Arg Glu
    1010   1015   1020

Phe Ile Gln Lys Ala Phe Val Arg Lys Gln Lys Ala Leu Asp Glu
    1025   1030   1035

Ile Lys Pro Leu Glu Asp Leu Asn Asn Lys Lys Asp Ser Cys Ile
    1040   1045   1050

Ser Asn His Thr Thr Ile Glu Ile Gly Lys Asp Leu Asn Tyr Leu
    1055   1060   1065

Lys Asp Gly Asn Gly Thr Thr Ser Gly Ile Gly Ser Ser Val Glu
    1070   1075   1080

Lys Tyr Val Val Asp Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn
    1085   1090   1095

Pro Ser Leu Thr Val Thr Val Pro Ile Ala Val Gly Glu Ser Asp
    1100   1105   1110

Phe Glu Asn Leu Asn Thr Glu Glu Phe Ser Ser Glu Ser Asp Met
    1115   1120   1125

Glu Glu Ser Lys Glu Lys Leu Asn Ala Thr Ser Ser Ser Glu Gly
    1130   1135   1140

Ser Thr Val Asp Ile Gly Ala Pro Ala Glu Gly Glu Gln Pro Glu
    1145   1150   1155

Val Glu Pro Glu Glu Ser Leu Glu Pro Glu Ala Cys Phe Thr Glu
    1160   1165   1170

Asp Cys Val Arg Lys Phe Lys Cys Cys Gln Ile Ser Ile Glu Glu
    1175   1180   1185

Gly Lys Gly Lys Leu Trp Trp Asn Leu Arg Lys Thr Cys Tyr Lys
    1190   1195   1200

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SSCP Update Sequences.ST25

Ile Val Glu His Asn Trp Phe Glu Thr Phe Ile Val Phe Met Ile
    1205   1210   1215

Leu Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Ile Glu
    1220   1225   1230

Gln Arg Lys Thr Ile Lys Thr Met Leu Glu Tyr Ala Asp Lys Val
    1235   1240   1245

Phe Thr Tyr Ile Phe Ile Leu Glu Met Leu Leu Lys Trp Val Ala
    1250   1255   1260

Tyr Gly Phe Gln Val Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp
    1265   1270   1275

Phe Leu Ile Val Asp Val Ser Leu Val Ser Leu Thr Ala Asn Ala
    1280   1285   1290

Leu Gly Tyr Ser Glu Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu
    1295   1300   1305

Arg Ala Leu Arg Pro Leu Arg Ala Leu Ser Arg Phe Glu Gly Met
    1310   1315   1320

Arg Val Val Val Asn Ala Leu Leu Gly Ala Ile Pro Ser Ile Met
    1325   1330   1335

Asn Val Leu Leu Val Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile
    1340   1345   1350

Met Gly Val Asn Leu Phe Ala Gly Lys Phe Tyr His Cys Ile Asn
    1355   1360   1365

Tyr Thr Thr Gly Glu Met Phe Asp Val Ser Val Val Asn Asn Tyr
    1370   1375   1380

Ser Glu Cys Lys Ala Leu Ile Glu Ser Asn Gln Thr Ala Arg Trp
    1385   1390   1395

Lys Asn Val Lys Val Asn Phe Asp Asn Val Gly Leu Gly Tyr Leu
    1400   1405   1410

Ser Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile Met
    1415   1420   1425

Tyr Ala Ala Val Asp Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr
    1430   1435   1440

Glu Asp Asn Leu Tyr Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile
    1445   1450   1455

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SSCP Update Sequences.ST25

Phe Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile
    1460   1465   1470

Asp Asn Phe Asn Gln Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile
    1475   1480   1485

Phe Met Thr Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys
    1490   1495   1500

Leu Gly Ser Lys Lys Pro Gln Lys Pro Ile Pro Arg Pro Ala Asn
    1505   1510   1515

Lys Phe Gln Gly Met Val Phe Asp Phe Val Thr Lys Gln Val Phe
    1520   1525   1530

Asp Ile Ser Ile Met Ile Leu Ile Cys Leu Asn Met Val Thr Met
    1535   1540   1545

Met Val Glu Thr Asp Asp Gln Ser Gln Glu Met Thr Asn Ile Leu
    1550   1555   1560

Tyr Trp Ile Asn Leu Val Phe Ile Val Leu Phe Thr Gly Glu Cys
    1565   1570   1575

Val Leu Lys Leu Ile Ser Leu Arg Tyr Tyr Tyr Phe Thr Ile Gly
    1580   1585   1590

Trp Asn Ile Phe Asp Phe Val Val Val Ile Leu Ser Ile Val Gly
    1595   1600   1605

Met Phe Leu Ala Glu Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr
    1610   1615   1620

Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg
    1625   1630   1635

Leu Ile Lys Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu
    1640   1645   1650

Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe
    1655   1660   1665

Leu Val Met Phe Ile Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala
    1670   1675   1680

Tyr Val Lys Arg Glu Val Gly Ile Asp Asp Met Phe Asn Phe Glu
    1685   1690   1695

Thr Phe Gly Asn Ser Met Ile Cys Leu Phe Gln Ile Thr Thr Ser
    1700   1705   1710

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SSCP Update Sequences.ST25

```
Ala Gly  Trp Asp Gly Leu Leu  Ala Pro Ile Leu Asn  Ser Gly Pro
    1715                 1720                  1725
                                  '

Pro Asp  Cys Asp Pro Asp Lys  Asp His Pro Gly Ser  Ser Val Lys
    1730                 1735                  1740


Gly Asp  Cys Gly Asn Pro Ser  Val Gly Ile Phe Phe  Phe Val Ser
    1745                 1750                  1755


Tyr Ile  Ile Ile Ser Phe Leu  Val Val Leu Asn Met  Tyr Ile Ala
    1760                 1765                  1770


Val Ile  Leu Glu Asn Phe Ser  Val Ala Thr Glu Glu  Ser Ala Glu
    1775                 1780                  1785


Pro Leu  Ser Glu Asp Asp Phe  Glu Met Phe Tyr Glu  Val Trp Glu
    1790                 1795                  1800


Lys Phe  Asp Pro Asp Ala Thr  Gln Phe Ile Glu Phe  Ala Lys Leu
    1805                 1810                  1815


Ser Asp  Phe Ala Asp Ala Leu  Asp Pro Pro Leu Leu  Ile Ala Lys
    1820                 1825                  1830
                    .

Pro Asn  Lys Val Gln Leu Ile  Ala Met Asp Leu Pro  Met Val Ser
    1835                 1840                  1845


Gly Asp  Arg Ile His Cys Leu  Asp Ile Leu Phe Ala  Phe Thr Lys
    1850                 1855                  1860


Arg Val  Leu Gly Glu Ser Gly  Glu Met Asp Ala Leu  Arg Ile Gln
    1865                 1870                  1875


Met Glu  Glu Arg Phe Met Ala  Ser Asn Pro Ser Lys  Val Ser Tyr
    1880                 1885                  1890


Glu Pro  Ile Thr Thr Thr Leu  Lys Arg Lys Gln Glu  Glu Val Ser
    1895                 1900                  1905


Ala Ile  Ile Ile Gln Arg Ala  Tyr Arg Arg Tyr Leu  Leu Lys Gln
    1910                 1915                  1920


Lys Val  Lys Lys Val Ser Ser  Ile Tyr Lys Lys Asp  Lys Gly Lys
    1925                 1930                  1935


Glu Cys  Asp Gly Thr Pro Ile  Lys Glu Asp Thr Leu  Ile Asp Lys
    1940                 1945                  1950


Leu Asn  Glu Asn Ser Thr Pro  Glu Lys Thr Asp Met  Thr Pro Ser
    1955                 1960                  1965
```

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SSCP Update Sequences.ST25

```
Thr Thr  Ser Pro Pro Ser Tyr  Asp Ser Val Thr Lys  Pro Glu Lys
    1970                1975            1980
```

```
Glu Lys  Phe Glu Lys Asp Lys . Ser Glu Lys Glu Asp  Lys Gly Lys
    1985                1990            1995
```

```
Asp Ile  Arg Glu Ser Lys Lys
    2000                2005
```

```
<210>   85
<211>   2005
<212>   PRT
<213>   Homo sapiens
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```
<400>   85
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```
Met Ala Gln Ser Val Leu Val Pro Pro Gly Pro Asp Ser Phe Arg Phe
1               5               10              15
```

```
Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Gln Arg Ile Ala Glu Glu
            20              25              30
```

```
Lys Ala Lys Arg Pro Lys Gln Glu Arg Lys Asp Glu Asp Asp Glu Asn
        35              40              45
```

```
Gly Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Ser Leu Pro Phe
    50              55              60
```

```
Ile Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Val Pro Leu Glu Asp
65              70              75              80
```

```
Leu Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys ·
                85              90              95
```

```
Gly Lys Ala Ile Ser Arg Phe Ser Ala Thr Pro Ala Leu Tyr Ile Leu
            100             105             110
```

```
Thr Pro Phe Asn Pro Ile Arg Lys Leu Ala Ile Lys Ile Leu Val His
        115             120             125
```

```
Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val
    130             135             140
```

```
Phe Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr
145             150             155             160
```

```
Thr Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Leu Ala
            165             170             175
```

```
Arg Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn
            180             185             190
```

SSCP Update Sequences.ST25

Trp Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val
        195   200   205

Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala
    210   215   220

Leu Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala
225   230   235   240

Leu Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val
            245   250   255

Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly
        260   265   270

Asn Leu Arg Asn Lys Cys Leu Gln Trp Pro Pro Asp Asn Ser Ser Phe
        275   280   285

Glu Ile Asn Ile Thr Ser Phe Phe Asn Asn Ser Leu Asp Gly Asn Gly
    290   295   300

Thr Thr Phe Asn Arg Thr Val Ser Ile Phe Asn Trp Asp Glu Tyr Ile
305   310   315   320

Glu Asp Lys Ser His Phe Tyr Phe Leu Glu Gly Gln Asn Asp Ala Leu
            325   330   335

Leu Cys Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Ile
        340   345   350

Cys Val Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp
        355   360   365

Thr Phe Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp
    370   375   380

Phe Trp Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr
385   390   395   400

Tyr Met Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu
            405   410   415

Ile Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn
        420   425   430

Gln Ala Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln
    435   440   445

Met Leu Glu Gln Leu Lys Lys Gln Gln Glu Glu Ala Gln Ala Ala Ala
    450   455   460

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SSCP Update Sequences.ST25

Ala Ala Ala Ser Ala Glu Ser Arg Asp Phe Ser Gly Ala Gly Gly Ile
465   470   475   480

Gly Val Phe Ser Glu Ser Ser Ser Val Ala Ser Lys Leu Ser Ser Lys
                485   490   495

Ser Glu Lys Glu Leu Lys Asn Arg Arg Lys Lys Lys Lys Gln Lys Glu
            500   505   510

Gln Ser Gly Glu Glu Glu Lys Asn Asp Arg Val Leu Lys Ser Glu Ser
            515   520   525

Glu Asp Ser Ile Arg Arg Lys Gly Phe Arg Phe Ser Leu Glu Gly Ser
    530   535   540

Arg Leu Thr Tyr Glu Lys Arg Phe Ser Ser Pro His Gln Ser Leu Leu
545   550   555   560

Ser Ile Arg Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Ala Ser
            565   570   575

Leu Phe Ser Phe Arg Gly Arg Ala Lys Asp Ile Gly Ser Glu Asn Asp
            580   585   590

Phe Ala Asp Asp Glu His Ser Thr Phe Glu Asp Asn Asp Ser Arg Arg
    595   600   605

Asp Ser Leu Phe Val Pro His Arg His Gly Glu Arg Arg His Ser Asn
    610   615   620

Val Ser Gln Ala Ser Arg Ala Ser Arg Val Leu Pro Ile Leu Pro Met
625   630   635   640

Asn Gly Lys Met His Ser Ala Val Asp Cys Asn Gly Val Val Ser Leu
            645   650   655

Val Gly Gly Pro Ser Thr Leu Thr Ser Ala Gly Gln Leu Leu Pro Glu
            660   665   670

Gly Thr Thr Thr Glu Thr Glu Ile Arg Lys Arg Arg Ser Ser Ser Tyr
            675   680   685

His Val Ser Met Asp Leu Leu Glu Asp Pro Thr Ser Arg Gln Arg Ala
    690   695   700

Met Ser Ile Ala Ser Ile Leu Thr Asn Thr Met Glu Glu Leu Glu Glu
705   710   715   720

Ser Arg Gln Lys Cys Pro Pro Cys Trp Tyr Lys Phe Ala Asn Met Cys
            725   730   735

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SSCP Update Sequences.ST25

Leu Ile Trp Asp Cys Cys Lys Pro Trp Leu Lys Val Lys His Leu Val
            740   745   750

Asn Leu Val Val Met Asp Pro Phe Val Asp Leu Ala Ile Thr Ile Cys
        755   760   765

Ile Val Leu Asn Thr Leu Phe Met Ala Met Glu His Tyr Pro Met Thr
    770   775   780

Glu Gln Phe Ser Ser Val Leu Ser Val Gly Asn Leu Val Phe Thr Gly
785   790   795   800

Ile Phe Thr Ala Glu Met Phe Leu Lys Ile Ile Ala Met Asp Pro Tyr
                805   810   815

Tyr Tyr Phe Gln Glu Gly Trp Asn Ile Phe Asp Gly Phe Ile Val Ser
            820   825   830

Leu Ser Leu Met Glu Leu Gly Leu Ala Asn Val Glu Gly Leu Ser Val
        835   840   845

Leu Arg Ser Phe Arg Leu Leu Arg Val Phe Lys Leu Ala Lys Ser Trp
    850   855   860

Pro Thr Leu Asn Met Leu Ile Lys Ile Ile Gly Asn Ser Val Gly Ala
865   870   875   880

Leu Gly Asn Leu Thr Leu Val Leu Ala Ile Ile Val Phe Ile Phe Ala
            885   890   895

Val Val Gly Met Gln Leu Phe Gly Lys Ser Tyr Lys Glu Cys Val Cys
            900   905   910

Lys Ile Ser Asn Asp Cys Glu Leu Pro Arg Trp His Met His Asp Phe
    915   920   925

Phe His Ser Phe Leu Ile Val Phe Arg Val Leu Cys Gly Glu Trp Ile
    930   935   940

Glu Thr Met Trp Asp Cys Met Glu Val Ala Gly Gln Thr Met Cys Leu
945   950   955   960

Thr Val Phe Met Met Val Met Val Ile Gly Asn Leu Val Val Leu Asn
            965   970   975

Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ser Asp Asn Leu Ala
        980   985   990

Ala Thr Asp Asp Asp Asn Glu Met Asn Asn Ile Gln Ile Ala Val Gly
        995   1000   1005

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SSCP Update Sequences.ST25

Arg Met Gln Lys Gly Ile Asp Phe Val Lys Arg Lys Ile Arg Glu
    1010   1015   1020

Phe Ile Gln Lys Ala Phe Val Arg Lys Gln Lys Ala Leu Asp Glu
    1025   1030   1035

Ile Lys Pro Leu Glu Asp Leu Asn Asn Lys Lys Asp Ser Cys Ile
    1040   1045   1050

Ser Asn His Thr Thr Ile Glu Ile Gly Lys Asp Leu Asn Tyr Leu
    1055   1060   1065

Lys Asp Gly Asn Gly Thr Thr Ser Gly Ile Gly Ser Ser Val Glu
    1070   1075   1080

Lys Tyr Val Val Asp Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn
    1085   1090   1095

Pro Ser Leu Thr Val Thr Val Pro Ile Ala Val Gly Glu Ser Asp
    1100   1105   1110

Phe Glu Asn Leu Asn Thr Glu Glu Phe Ser Ser Glu Ser Asp Met
    1115   1120   1125

Glu Glu Ser Lys Glu Lys Leu Asn Ala Thr Ser Ser Ser Glu Gly
    1130   1135   1140

Ser Thr Val Asp Ile Gly Ala Pro Ala Glu Gly Glu Gln Pro Glu
    1145   1150   1155

Val Glu Pro Glu Glu Ser Leu Glu Pro Glu Ala Cys Phe Thr Glu
    1160   1165   1170

Asp Cys Val Arg Lys Phe Lys Cys Cys Gln Ile Ser Ile Glu Glu
    1175   1180   1185

Gly Lys Gly Lys Leu Trp Trp Asn Leu Arg Lys Thr Cys Tyr Lys
    1190   1195   1200

Ile Val Glu His Asn Trp Phe Glu Thr Phe Ile Val Phe Met Ile
    1205   1210   1215

Leu Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Ile Glu
    1220   1225   1230

Gln Arg Lys Thr Ile Lys Thr Met Leu Glu Tyr Ala Asp Lys Val
    1235   1240   1245

Phe Thr Tyr Ile Phe Ile Leu Glu Met Leu Leu Lys Trp Val Ala
    1250   1255   1260

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SSCP Update Sequences.ST25

Tyr Gly Phe Gln Val Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp
    1265   1270   1275

Phe Leu Ile Val Asp Val Ser Leu Val Ser Leu Thr Ala Asn Ala
    1280   1285   1290

Leu Gly Tyr Ser Glu Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu
    1295   1300   1305

Arg Ala Leu Arg Pro Leu Arg Ala Leu Ser Arg Phe Glu Gly Met
    1310   1315   1320

Arg Val Val Val Asn Ala Leu Leu Gly Ala Ile Pro Ser Ile Met
    1325   1330   1335

Asn Val Leu Leu Val Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile
    1340   1345   1350

Met Gly Val Asn Leu Phe Ala Gly Lys Phe Tyr His Cys Ile Asn
    1355   1360   1365

Tyr Thr Thr Gly Glu Met Phe Asp Val Ser Val Val Asn Asn Tyr
    1370   1375   1380

Ser Glu Cys Lys Ala Leu Ile Glu Ser Asn Gln Thr Ala Arg Trp
    1385   1390   1395

Lys Asn Val Lys Val Asn Phe Asp Asn Val Gly Leu Gly Tyr Leu
    1400   1405   1410

Ser Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile Met
    1415   1420   1425

Tyr Ala Ala Val Asp Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr
    1430   1435   1440

Glu Asp Asn Leu Tyr Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile
    1445   1450   1455

Phe Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile
    1460   1465   1470

Asp Asn Phe Asn Gln Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile
    1475   1480   1485

Phe Met Thr Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys
    1490   1495   1500

Leu Gly Ser Lys Lys Pro Gln Lys Pro Ile Pro Arg Pro Ala Asn
    1505   1510   1515

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SSCP Update Sequences.ST25

```
Lys Phe Gln Gly Met Val Phe Asp Phe Val Thr Lys Gln Val Phe
    1520                1525                1530

Asp Ile Ser Ile Met Ile Leu Ile Cys Leu Asn Met Val Thr Met
    1535                1540                1545

Met Val Glu Thr Asp Asp Gln Ser Gln Glu Met Thr Asn Ile Leu
    1550                1555                1560

Tyr Trp Ile Asn Leu Val Phe Ile Val Leu Phe Thr Gly Glu Cys
    1565                1570                1575

Val Leu Lys Leu Ile Ser Leu Arg Tyr Tyr Tyr Phe Thr Ile Gly
    1580                1585                1590

Trp Asn Ile Phe Asp Phe Val Val Val Ile Leu Ser Ile Val Gly
    1595                1600                1605

Met Phe Leu Ala Glu Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr
    1610                1615                1620

Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg
    1625                1630                1635

Leu Ile Lys Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu
    1640                1645                1650

Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe
    1655                1660                1665

Leu Val Met Phe Ile Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala
    1670                1675                1680

Tyr Val Lys Arg Glu Val Gly Ile Asp Asp Met Phe Asn Phe Glu
    1685                1690                1695

Thr Phe Gly Asn Ser Met Ile Cys Leu Phe Gln Ile Thr Thr Ser
    1700                1705                1710

Ala Gly Trp Asp Gly Leu Leu Ala Pro Ile Leu Asn Ser Gly Pro
    1715                1720                1725

Pro Asp Cys Asp Pro Asp Lys Asp His Pro Gly Ser Ser Val Lys
    1730                1735                1740

Gly Asp Cys Gly Asn Pro Ser Val Gly Ile Phe Phe Phe Val Ser
    1745                1750                1755

Tyr Ile Ile Ile Ser Phe Leu Val Val Leu Asn Met Tyr Ile Ala
    1760                1765                1770
```

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SSCP Update Sequences.ST25

Val Ile Leu Glu Asn Phe Ser Val Ala Thr Glu Glu Ser Ala Glu
    1775   1780   1785

Pro Leu Ser Glu Asp Asp Phe Glu Met Phe Tyr Glu Val Trp Glu
    1790   1795   1800

Lys Phe Asp Pro Asp Ala Thr Gln Phe Ile Glu Phe Ala Lys Leu
    1805   1810   1815

Ser Asp Phe Ala Asp Ala Leu Asp Pro Pro Leu Leu Ile Ala Lys
    1820   1825   1830

Pro Asn Lys Val Gln Leu Ile Ala Met Asp Leu Pro Met Val Ser
    1835   1840   1845

Gly Asp Arg Ile His Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys
    1850   1855   1860

Arg Val Leu Gly Glu Ser Gly Glu Met Asp Ala Leu Arg Ile Gln
    1865   1870   1875

Met Glu Glu Arg Phe Met Ala Ser Asn Pro Ser Lys Val Ser Tyr
    1880   1885   1890

Glu Pro Ile Thr Thr Thr Leu Lys Arg Lys Gln Glu Glu Val Ser
    1895   1900   1905

Ala Ile Ile Ile Gln Arg Ala Tyr Arg Arg Tyr Leu Leu Lys Gln
    1910   1915   1920

Lys Val Lys Lys Val Ser Ser Ile Tyr Lys Lys Asp Lys Gly Lys
    1925   1930   1935

Glu Cys Asp Gly Thr Pro Ile Lys Glu Asp Thr Leu Ile Asp Lys
    1940   1945   1950

Leu Asn Glu Asn Ser Thr Pro Glu Lys Thr Asp Met Thr Pro Ser
    1955   1960   1965

Thr Thr Ser Pro Pro Ser Tyr Asp Ser Val Thr Lys Pro Glu Lys
    1970   1975   1980

Glu Lys Phe Glu Lys Asp Lys Ser Glu Lys Glu Asp Lys Gly Lys
    1985   1990   1995

Asp Ile Arg Glu Ser Lys Lys
    2000   2005

<210> 86
<211> 2005
<212> PRT

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SSCP Update Sequences.ST25

<213>   Homo sapiens

<400>   86

Met Ala Gln Ser Val Leu Val Pro Pro Gly Pro Asp Ser Phe Arg Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Gln Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Arg Pro Lys Gln Glu Arg Lys Asp Glu Asp Asp Glu Asn
        35   40   45

Gly Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Ser Leu Pro Phe
    50   55   60

Ile Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Val Pro Leu Glu Asp
65   70   75   80

Leu Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys
                85   90   95

Gly Lys Ala Ile Ser Arg Phe Ser Ala Thr Pro Ala Leu Tyr Ile Leu
            100   105   110

Thr Pro Phe Asn Pro Ile Arg Lys Leu Ala Ile Lys Ile Leu Val His
        115   120   125

Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val
    130   135   140

Phe Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr
145   150   155   160

Thr Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Leu Ala
                165   170   175

Arg Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn
            180   185   190

Trp Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val
        195   200   205

Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala
    210   215   220

Leu Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala
225   230   235   240

Leu Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val
                245   250   255

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SSCP Update Sequences.ST25

Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly
            260   265   270

Asn Leu Arg Asn Lys Cys Leu Gln Trp Pro Pro Asp Asn Ser Ser Phe
            275   280   285

Glu Ile Asn Ile Thr Ser Phe Phe Asn Asn Ser Leu Asp Gly Asn Gly
    290   295   300

Thr Thr Phe Asn Arg Thr Val Ser Ile Phe Asn Trp Asp Glu Tyr Ile
305   310   315   320

Glu Asp Lys Ser His Phe Tyr Phe Leu Glu Gly Gln Asn Asp Ala Leu
            325   330   335

Leu Cys Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Ile
            340   345   350

Cys Val Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp
            355   360   365

Thr Phe Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp
    370   375   380

Phe Trp Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr
385   390   395   400

Tyr Met Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu
            405   410   415

Ile Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn
            420   425   430

Gln Ala Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln
    435   440   445

Met Leu Glu Gln Leu Lys Lys Gln Gln Glu Glu Ala Gln Ala Ala Ala
    450   455   460

Ala Ala Ala Ser Ala Glu Ser Arg Asp Phe Ser Gly Ala Gly Gly Ile
465   470   475   480

Gly Val Phe Ser Glu Ser Ser Ser Val Ala Ser Lys Leu Ser Ser Lys
            485   490   495

Ser Glu Lys Glu Leu Lys Asn Arg Arg Lys Lys Lys Lys Gln Lys Glu
            500   505   510

Gln Ser Gly Glu Glu Glu Lys Asn Asp Arg Val Leu Lys Ser Glu Ser
            515   520   525

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SSCP Update Sequences.ST25

Glu Asp Ser Ile Arg Arg Lys Gly Phe Arg Phe Ser Leu Glu Gly Ser
    530   535   540
.

Arg Leu Thr Tyr Glu Lys Arg Phe Ser Ser Pro His Gln Ser Leu Leu
545   550   555   560

Ser Ile Arg Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Ala Ser
            565   570   575

Leu Phe Ser Phe Arg Gly Arg Ala Lys Asp Ile Gly Ser Glu Asn Asp
            580   585   590

Phe Ala Asp Asp Glu His Ser Thr Phe Glu Asp Asn Asp Ser Arg Arg
        595   600   605

Asp Ser Leu Phe Val Pro His Arg His Gly Glu Arg Arg His Ser Asn
610   615   620

Val Ser Gln Ala Ser Arg Ala Ser Arg Val Leu Pro Ile Leu Pro Met
625   630   635   640

Asn Gly Lys Met His Ser Ala Val Asp Cys Asn Gly Val Val Ser Leu
            645   650   655

Val Gly Gly Pro Ser Thr Leu Thr Ser Ala Gly Gln Leu Leu Pro Glu
            660   665   670

Gly Thr Thr Thr Glu Thr Glu Ile Arg Lys Arg Arg Ser Ser Ser Tyr
            675   680   685

His Val Ser Met Asp Leu Leu Glu Asp Pro Thr Ser Arg Gln Arg Ala
    690   695   700

Met Ser Ile Ala Ser Ile Leu Thr Asn Thr Met Glu Glu Leu Glu Glu
705   710   715   720

Ser Arg Gln Lys Cys Pro Pro Cys Trp Tyr Lys Phe Ala Asn Met Cys
            725   730   735

Leu Ile Trp Asp Cys Cys Lys Pro Trp Leu Lys Val Lys His Leu Val
            740   745   750

Asn Leu Val Val Met Asp Pro Phe Val Asp Leu Ala Ile Thr Ile Cys
            755   760   765

Ile Val Leu Asn Thr Leu Phe Met Ala Met Glu His Tyr Pro Met Thr
    770   775   780

Glu Gln Phe Ser Ser Val Leu Ser Val Gly Asn Leu Val Phe Thr Gly
785   790   795   800

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SSCP Update Sequences.ST25

```
Ile Phe Thr Ala Glu Met Phe Leu Lys Ile Ile Ala Met Asp Pro Tyr
            805             810              815
```

```
Tyr Tyr Phe Gln Glu Gly Trp Asn Ile Phe Asp Gly Phe Ile Val Ser
            820             825              830
```

```
Leu Ser Leu Met Glu Leu Gly Leu Ala Asn Val Glu Gly Leu Ser Val
        835             840             845
```

```
Leu Arg Ser Phe Arg Leu Leu Arg Val Phe Lys Leu Ala Lys Ser Trp
    850             855             860
```

```
Pro Thr Leu Asn Met Leu Ile Lys Ile Ile Gly Asn Ser Val Gly Ala
865             870             875             880
```

```
Leu Gly Asn Leu Thr Leu Val Leu Ala Ile Ile Val Phe Ile Phe Ala
            885             890             895
```

```
Val Val Gly Met Gln Leu Phe Gly Lys Ser Tyr Lys Glu Cys Val Cys
            900             905             910
```

```
Lys Ile Ser Asn Asp Cys Glu Leu Pro Arg Trp His Met His Asp Phe
        915             920             925
```

```
Phe His Ser Phe Leu Ile Val Phe Arg Val Leu Cys Gly Glu Trp Ile
    930             935             940
```

```
Glu Thr Met Trp Asp Cys Met Glu Val Ala Gly Gln Thr Met Cys Leu
945             950             955             960
```

```
Thr Val Phe Met Met Val Met Val Ile Gly Asn Leu Val Val Leu Asn
            965             970             975
```

```
Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ser Asp Asn Leu Ala
        980             985             990
```

```
Ala Thr Asp Asp Asp Asn Glu Met Asn Asn Leu Gln Ile Ala Val Gly
        995             1000            1005
```

```
Arg Met Gln Lys Gly Ile Asp Phe Val Lys Arg Lys Ile Arg Glu
    1010            1015            1020
```

```
Phe Ile Gln Lys Ala Phe Val Arg Lys Gln Lys Ala Leu Asp Glu
    1025·           1030            1035
```

```
Ile Lys Pro Leu Glu Asp Leu Asn Asn Lys Lys Asp Ser Cys Ile
    1040            1045            1050
```

```
Ser Asn His Thr Thr Ile Glu Ile Gly Lys Asp Leu Asn Tyr Leu
    1055            1060            1065
```

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SSCP Update Sequences.ST25

Lys Asp Gly Asn Gly Thr Thr Ser Gly Ile Gly Ser Ser Val Glu
    1070   1075   1080

Lys Tyr Val Val Asp Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn
    1085   1090   1095

Pro Ser Leu Thr Val Thr Val Pro Ile Ala Val Gly Glu Ser Asp
    1100   1105   1110

Phe Glu Asn Leu Asn Thr Glu Glu Phe Ser Ser Glu Ser Asp Met
    1115   1120   1125

Glu Glu Ser Lys Glu Lys Leu Asn Ala Thr Ser Ser Ser Glu Gly
    1130   1135   1140

Ser Thr Val Asp Ile Gly Ala Pro Ala Glu Gly Glu Gln Pro Glu
    1145   1150   1155

Val Glu Pro Glu Glu Ser Leu Glu Pro Glu Ala Cys Phe Thr Glu
    1160   1165   1170

Asp Cys Val Arg Lys Phe Lys Cys Cys Gln Ile Ser Ile Glu Glu
    1175   1180   1185

Gly Lys Gly Lys Leu Trp Trp Asn Leu Arg Lys Ala Cys Tyr Lys
    1190   1195   1200

Ile Val Glu His Asn Trp Phe Glu Thr Phe Ile Val Phe Met Ile
    1205   1210   1215

Leu Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Ile Glu
    1220   1225   1230

Gln Arg Lys Thr Ile Lys Thr Met Leu Glu Tyr Ala Asp Lys Val
    1235   1240   1245

Phe Thr Tyr Ile Phe Ile Leu Glu Met Leu Leu Lys Trp Val Ala
    1250   1255   1260

Tyr Gly Phe Gln Val Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp
    1265   1270   1275

Phe Leu Ile Val Asp Val Ser Leu Val Ser Leu Thr Ala Asn Ala
    1280   1285   1290

Leu Gly Tyr Ser Glu Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu
    1295   1300   1305

Arg Ala Leu Arg Pro Leu Arg Ala Leu Ser Arg Phe Glu Gly Met
    1310   1315   1320

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SSCP Update Sequences.ST25

Arg Val Val Val Asn Ala Leu Leu Gly Ala Ile Pro Ser Ile Met
    1325   1330   1335

Asn Val Leu Leu Val Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile
    1340   1345   1350

Met Gly Val Asn Leu Phe Ala Gly Lys Phe Tyr His Cys Ile Asn
    1355   1360   1365

Tyr Thr Thr Gly Glu Met Phe Asp Val Ser Val Val Asn Asn Tyr
    1370   1375   1380

Ser Glu Cys Lys Ala Leu Ile Glu Ser Asn Gln Thr Ala Arg Trp
    1385   1390   1395

Lys Asn Val Lys Val Asn Phe Asp Asn Val Gly Leu Gly Tyr Leu
    1400   1405   1410

Ser Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile Met
    1415   1420   1425

Tyr Ala Ala Val Asp Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr
    1430   1435   1440

Glu Asp Asn Leu Tyr Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile
    1445   1450   1455

Phe Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile
    1460   1465   1470

Asp Asn Phe Asn Gln Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile
    1475   1480   1485

Phe Met Thr Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys
    1490   1495   1500

Leu Gly Ser Lys Lys Pro Gln Lys Pro Ile Pro Arg Pro Ala Asn
    1505   1510   1515

Lys Phe Gln Gly Met Val Phe Asp Phe Val Thr Lys Gln Val Phe
    1520   1525   1530

Asp Ile Ser Ile Met Ile Leu Ile Cys Leu Asn Met Val Thr Met
    1535   1540   1545

Met Val Glu Thr Asp Asp Gln Ser Gln Glu Met Thr Asn Ile Leu
    1550   1555   1560

Tyr Trp Ile Asn Leu Val Phe Ile Val Leu Phe Thr Gly Glu Cys
    1565   1570   1575

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SSCP Update Sequences.ST25

Val Leu Lys Leu Ile Ser Leu Arg Tyr Tyr Tyr Phe Thr Ile Gly
1580   1585   1590

Trp Asn Ile Phe Asp Phe Val Val Val Ile Leu Ser Ile Val Gly
1595   1600   1605

Met Phe Leu Ala Glu Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr
1610   1615   1620

Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg
1625   1630   1635

Leu Ile Lys Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu
1640   1645   1650

Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe
1655   1660   1665

Leu Val Met Phe Ile Tyr Ala Ile Phe Gly Met Ser Asn Phe Ala
1670   1675   1680

Tyr Val Lys Arg Glu Val Gly Ile Asp Asp Met Phe Asn Phe Glu
1685   1690   1695

Thr Phe Gly Asn Ser Met Ile Cys Leu Phe Gln Ile Thr Thr Ser
1700   1705   1710

Ala Gly Trp Asp Gly Leu Leu Ala Pro Ile Leu Asn Ser Gly Pro
1715   1720   1725

Pro Asp Cys Asp Pro Asp Lys Asp His Pro Gly Ser Ser Val Lys
1730   1735   1740

Gly Asp Cys Gly Asn Pro Ser Val Gly Ile Phe Phe Phe Val Ser
1745   1750   1755

Tyr Ile Ile Ile Ser Phe Leu Val Val Leu Asn Met Tyr Ile Ala
1760   1765   1770

Val Ile Leu Glu Asn Phe Ser Val Ala Thr Glu Glu Ser Ala Glu
1775   1780   1785

Pro Leu Ser Glu Asp Asp Phe Glu Met Phe Tyr Glu Val Trp Glu
1790   1795   1800

Lys Phe Asp Pro Asp Ala Thr Gln Phe Ile Glu Phe Ala Lys Leu
1805   1810   1815

Ser Asp Phe Ala Asp Ala Leu Asp Pro Pro Leu Leu Ile Ala Lys
1820   1825   1830

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SSCP Update Sequences.ST25

Pro Asn Lys Val Gln Leu Ile Ala Met Asp Leu Pro Met Val Ser
    1835   1840   1845

Gly Asp Arg Ile His Cys Leu Asp Ile Leu Phe Ala Phe Thr Lys
    1850   1855   1860

Arg Val Leu Gly Glu Ser Gly Glu Met Asp Ala Leu Arg Ile Gln
    1865   1870   1875

Met Glu Glu Arg Phe Met Ala Ser Asn Pro Ser Lys Val Ser Tyr
  · 1880   1885   1890

Glu Pro Ile Thr Thr Thr Leu Lys Arg Lys Gln Glu Glu Val Ser
    1895   1900   1905

Ala Ile Ile Ile Gln Arg Ala Tyr Arg Arg Tyr Leu Leu Lys Gln
    1910   1915   1920

Lys Val Lys Lys Val Ser Ser Ile Tyr Lys Lys Asp Lys Gly Lys
    1925   1930   1935

Glu Cys Asp Gly Thr Pro Ile Lys Glu Asp Thr Leu Ile Asp Lys
    1940   1945   1950

Leu Asn Glu Asn Ser Thr Pro Glu Lys Thr Asp Met Thr Pro Ser
    1955   1960   1965

Thr Thr Ser Pro Pro Ser Tyr Asp Ser Val Thr Lys Pro Glu Lys
    1970   1975   1980

Glu Lys Phe Glu Lys Asp Lys Ser Glu Lys Glu Asp Lys Gly Lys
    1985   1990   1995

Asp Ile Arg Glu Ser Lys Lys
    2000   2005

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<211>   2005
<212>   PRT
<213>   Homo sapiens

<400>   87

Met Ala Gln Ser Val Leu Val Pro Pro Gly Pro Asp Ser Phe Arg Phe
1   5   10   15

Phe Thr Arg Glu Ser Leu Ala Ala Ile Glu Gln Arg Ile Ala Glu Glu
            20   25   30

Lys Ala Lys Arg Pro Lys Gln Glu Arg Lys Asp Glu Asp Asp Glu Asn
        35   40   45

Gly Pro Lys Pro Asn Ser Asp Leu Glu Ala Gly Lys Ser Leu Pro Phe

SSCP Update Sequences.ST25
      50   55   60

Ile Tyr Gly Asp Ile Pro Pro Glu Met Val Ser Val Pro Leu Glu Asp
65   70   75   80

Leu Asp Pro Tyr Tyr Ile Asn Lys Lys Thr Phe Ile Val Leu Asn Lys
                    85   90   95

Gly Lys Ala Ile Ser Arg Phe Ser Ala Thr Pro Ala Leu Tyr Ile Leu
                100   105   110

Thr Pro Phe Asn Pro Ile Arg Lys Leu Ala Ile Lys Ile Leu Val His
            115   120   125

Ser Leu Phe Asn Met Leu Ile Met Cys Thr Ile Leu Thr Asn Cys Val
    130   135   140

Phe Met Thr Met Ser Asn Pro Pro Asp Trp Thr Lys Asn Val Glu Tyr
145   150   155   160

Thr Phe Thr Gly Ile Tyr Thr Phe Glu Ser Leu Ile Lys Ile Leu Ala
                165   170   175

Arg Gly Phe Cys Leu Glu Asp Phe Thr Phe Leu Arg Asp Pro Trp Asn
            180   185   190

Trp Leu Asp Phe Thr Val Ile Thr Phe Ala Tyr Val Thr Glu Phe Val
    195   200   205

Asp Leu Gly Asn Val Ser Ala Leu Arg Thr Phe Arg Val Leu Arg Ala
    210   215   220

Leu Lys Thr Ile Ser Val Ile Pro Gly Leu Lys Thr Ile Val Gly Ala
225   230   235   240

Leu Ile Gln Ser Val Lys Lys Leu Ser Asp Val Met Ile Leu Thr Val
                245   250   255

Phe Cys Leu Ser Val Phe Ala Leu Ile Gly Leu Gln Leu Phe Met Gly
            260   265   270

Asn Leu Arg Asn Lys Cys Leu Gln Trp Pro Pro Asp Asn Ser Ser Phe
        275   280   285

Glu Ile Asn Ile Thr Ser Phe Phe Asn Asn Ser Leu Asp Gly Asn Gly
    290   295   300

Thr Thr Phe Asn Arg Thr Val Ser Ile Phe Asn Trp Asp Glu Tyr Ile
305   310   315   320

Glu Asp Lys Ser His Phe Tyr Phe Leu Glu Gly Gln Asn Asp Ala Leu

SSCP Update Sequences.ST25
                325   330   335

Leu Cys Gly Asn Ser Ser Asp Ala Gly Gln Cys Pro Glu Gly Tyr Ile
            340   345   350

Cys Val Lys Ala Gly Arg Asn Pro Asn Tyr Gly Tyr Thr Ser Phe Asp
            355   360   365

Thr Phe Ser Trp Ala Phe Leu Ser Leu Phe Arg Leu Met Thr Gln Asp
    370   375   380

Phe Trp Glu Asn Leu Tyr Gln Leu Thr Leu Arg Ala Ala Gly Lys Thr
385   390   395   400

Tyr Met Ile Phe Phe Val Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu
            405   410   415

Ile Asn Leu Ile Leu Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn
            420   425   430

Gln Ala Thr Leu Glu Glu Ala Glu Gln Lys Glu Ala Glu Phe Gln Gln
            435   440   445

Met Leu Glu Gln Leu Lys Lys Gln Gln Glu Glu Ala Gln Ala Ala Ala
    450   455   460

Ala Ala Ala Ser Ala Glu Ser Arg Asp Phe Ser Gly Ala Gly Gly Ile
465   470   475   480

Gly Val Phe Ser Glu Ser Ser Ser Val Ala Ser Lys Leu Ser Ser Lys
            485   490   495

Ser Glu Lys Glu Leu Lys Asn Arg Arg Lys Lys Lys Lys Gln Lys Glu
            500   505   510

Gln Ser Gly Glu Glu Glu Lys Asn Asp Arg Val Leu Lys Ser Glu Ser
            515   520   525

Glu Asp Ser Ile Arg Arg Lys Gly Phe Arg Phe Ser Leu Glu Gly Ser
    530   535   540

Arg Leu Thr Tyr Glu Lys Arg Phe Ser Ser Pro His Gln Ser Leu Leu
545   550   555   560

Ser Ile Arg Gly Ser Leu Phe Ser Pro Arg Arg Asn Ser Arg Ala Ser
            565   570   575

Leu Phe Ser Phe Arg Gly Arg Ala Lys Asp Ile Gly Ser Glu Asn Asp
            580   585   590

Phe Ala Asp Asp Glu His Ser Thr Phe Glu Asp Asn Asp Ser Arg Arg
                            Page 209

      595   600   605

Asp Ser Leu Phe Val Pro His Arg His Gly Glu Arg Arg His Ser Asn
   . 610   615   620

Val Ser Gln Ala Ser Arg Ala Ser Arg Val Leu Pro Ile Leu Pro Met
625   630   635   640

Asn Gly Lys Met His Ser Ala Val Asp Cys Asn Gly Val Val Ser Leu
            645   650   655

Val Gly Gly Pro Ser Thr Leu Thr Ser Ala Gly Gln Leu Leu Pro Glu
            660   665   670

Gly Thr Thr Thr Glu Thr Glu Ile Arg Lys Arg Arg Ser Ser Ser Tyr
        675   680   685

His Val Ser Met Asp Leu Leu Glu Asp Pro Thr Ser Arg Gln Arg Ala
    690   695   700

Met Ser Ile Ala Ser Ile Leu Thr Asn Thr Met Glu Glu Leu Glu Glu
705   710   715   720

Ser Arg Gln Lys Cys Pro Pro Cys Trp Tyr Lys Phe Ala Asn Met Cys
            725   730   735

Leu Ile Trp Asp Cys Cys Lys Pro Trp Leu Lys Val Lys His Leu Val
            740   745   750

Asn Leu Val Val Met Asp Pro Phe Val Asp Leu Ala Ile Thr Ile Cys
        755   760   765

Ile Val Leu Asn Thr Leu Phe Met Ala Met Glu His Tyr Pro Met Thr
    770   775   780

Glu Gln Phe Ser Ser Val Leu Ser Val Gly Asn Leu Val Phe Thr Gly
785   790   795   800

Ile Phe Thr Ala Glu Met Phe Leu Lys Ile Ile Ala Met Asp Pro Tyr
            805   810   815

Tyr Tyr Phe Gln Glu Gly Trp Asn Ile Phe Asp Gly Phe Ile Val Ser
            820   825   830

Leu Ser Leu Met Glu Leu Gly Leu Ala Asn Val Glu Gly Leu Ser Val
        835   840   845

Leu Arg Ser Phe Arg Leu Leu Arg Val Phe Lys Leu Ala Lys Ser Trp
    850   855   860

Pro Thr Leu Asn Met Leu Ile Lys Ile Ile Gly Asn Ser Val Gly Ala
                          Page 210

SSCP Update Sequences.ST25

865   870   875   880

Leu Gly Asn Leu Thr Leu Val Leu Ala Ile Ile Val Phe Ile Phe Ala
                    885   890   895

Val Val Gly Met Gln Leu Phe Gly Lys Ser Tyr Lys Glu Cys Val Cys
                900   905   910

Lys Ile Ser Asn Asp Cys Glu Leu Pro Arg Trp His Met His Asp Phe
            915   920   925

Phe His Ser Phe Leu Ile Val Phe Arg Val Leu Cys Gly Glu Trp Ile
    930   935   940

Glu Thr Met Trp Asp Cys Met Glu Val Ala Gly Gln Thr Met Cys Leu
945   950   955   960

Thr Val Phe Met Met Val Met Val Ile Gly Asn Leu Val Val Leu Asn
                965   970   975

Leu Phe Leu Ala Leu Leu Leu Ser Ser Phe Ser Ser Asp Asn Leu Ala
            980   985   990

Ala Thr Asp Asp Asp Asn Glu Met Asn Asn Leu Gln Ile Ala Val Gly
            995   1000   1005

Arg Met Gln Lys Gly Ile Asp Phe Val Lys Arg Lys Ile Arg Glu
    1010   1015   1020

Phe Ile Gln Lys Ala Phe Val Arg Lys Gln Lys Ala Leu Asp Glu
    1025   1030   1035

Ile Lys Pro Leu Glu Asp Leu Asn Asn Lys Lys Asp Ser Cys Ile
    1040   1045   1050

Ser Asn His Thr Thr Ile Glu Ile Gly Lys Asp Leu Asn Tyr Leu
    1055   1060   1065

Lys Asp Gly Asn Gly Thr Thr Ser Gly Ile Gly Ser Ser Val Glu
    1070   1075   1080

Lys Tyr Val Val Asp Glu Ser Asp Tyr Met Ser Phe Ile Asn Asn
    1085   1090   1095

Pro Ser Leu Thr Val Thr Val Pro Ile Ala Val Gly Glu Ser Asp
    1100   1105   1110

Phe Glu Asn Leu Asn Thr Glu Glu Phe Ser Ser Glu Ser Asp Met
    1115   1120   1125

Glu Glu Ser Lys Glu Lys Leu Asn Ala Thr Ser Ser Ser Glu Gly

```
     1130                      1135              1140
```

Ser Thr Val Asp Ile Gly Ala Pro Ala Glu Gly Glu Gln Pro Glu
    1145   1150   1155

Val Glu Pro Glu Glu Ser Leu Glu Pro Glu Ala Cys Phe Thr Glu
    1160   1165   1170

Asp Cys Val Arg Lys Phe Lys Cys Cys Gln Ile Ser Ile Glu Glu
    1175   1180   1185

Gly Lys Gly Lys Leu Trp Trp Asn Leu Arg Lys Thr Cys Tyr Lys
    1190   1195   1200

Ile Val Glu His Asn Trp Phe Glu Thr Phe Ile Val Phe Met Ile
    1205   1210   1215

Leu Leu Ser Ser Gly Ala Leu Ala Phe Glu Asp Ile Tyr Ile Glu
    1220   1225   1230

Gln Arg Lys Thr Ile Lys Thr Met Leu Glu Tyr Ala Asp Lys Val
    1235   1240   1245

Phe Thr Tyr Ile Phe Ile Leu Glu Met Leu Leu Lys Trp Val Ala
    1250   1255   1260

Tyr Gly Phe Gln Val Tyr Phe Thr Asn Ala Trp Cys Trp Leu Asp
    1265   1270   1275

Phe Leu Ile Val Asp Val Ser Leu Val Ser Leu Thr Ala Asn Ala
    1280   1285   1290

Leu Gly Tyr Ser Glu Leu Gly Ala Ile Lys Ser Leu Arg Thr Leu
    1295   1300   1305

Arg Ala Leu Arg Pro Leu Arg Ala Leu Ser Gln Phe Glu Gly Met
    1310   1315   1320

Arg Val Val Val Asn Ala Leu Leu Gly Ala Ile Pro Ser Ile Met
    1325   1330   1335

Asn Val Leu Leu Val Cys Leu Ile Phe Trp Leu Ile Phe Ser Ile
    1340   1345   1350

Met Gly Val Asn Leu Phe Ala Gly Lys Phe Tyr His Cys Ile Asn
    1355   1360   1365

Tyr Thr Thr Gly Glu Met Phe Asp Val Ser Val Val Asn Asn Tyr
    1370   1375   1380

Ser Glu Cys Lys Ala Leu Ile Glu Ser Asn Gln Thr Ala Arg Trp

SSCP Update Sequences.ST25

        1385   1390   1395

Lys Asn Val Lys Val Asn Phe Asp Asn Val Gly Leu Gly Tyr Leu
    1400   1405   1410

Ser Leu Leu Gln Val Ala Thr Phe Lys Gly Trp Met Asp Ile Met
    1415   1420   1425

Tyr Ala Ala Val Asp Ser Arg Asn Val Glu Leu Gln Pro Lys Tyr
    1430   1435   1440

Glu Asp Asn Leu Tyr Met Tyr Leu Tyr Phe Val Ile Phe Ile Ile
    1445   1450   1455

Phe Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile
    1460   1465   1470

Asp Asn Phe Asn Gln Gln Lys Lys Lys Phe Gly Gly Gln Asp Ile
    1475   1480   1485

Phe Met Thr Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys
    1490   1495   1500

Leu Gly Ser Lys Lys Pro Gln Lys Pro Ile Pro Arg Pro Ala Asn
    1505   1510   1515

Lys Phe Gln Gly Met Val Phe Asp Phe Val Thr Lys Gln Val Phe
    1520   1525   1530

Asp Ile Ser Ile Met Ile Leu Ile Cys Leu Asn Met Val Thr Met
    1535   1540   1545

Met Val Glu Thr Asp Asp Gln Ser Gln Glu Met Thr Asn Ile Leu
    1550   1555   1560

Tyr Trp Ile Asn Leu Val Phe Ile Val Leu Phe Thr Gly Glu Cys
    1565   1570   1575

Val Leu Lys Leu Ile Ser Leu Arg Tyr Tyr Tyr Phe Thr Ile Gly
    1580   1585   1590

Trp Asn Ile Phe Asp Phe Val Val Val Ile Leu Ser Ile Val Gly
    1595   1600   1605

Met Phe Leu Ala Glu Leu Ile Glu Lys Tyr Phe Val Ser Pro Thr
    1610   1615   1620

Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg
    1625   1630   1635

Leu Ile Lys Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu
                            Page 213

SSCP Update Sequences.ST25
```
                       1640                          1645                          1650


Met Met  Ser Leu Pro Ala Leu  Phe Asn Ile Gly Leu  Leu Leu Phe
    1655                          1660                          1665


Leu Val  Met Phe Ile Tyr Ala  Ile Phe Gly Met Ser  Asn Phe Ala
    1670                          1675                          1680


Tyr Val  Lys Arg Glu Val Gly  Ile Asp Asp Met Phe  Asn Phe Glu
    1685                          1690                          1695


Thr Phe  Gly Asn Ser Met Ile  Cys Leu Phe Gln Ile  Thr Thr Ser
    1700                          1705                          1710


Ala Gly  Trp Asp Gly Leu Leu  Ala Pro Ile Leu Asn  Ser Gly Pro
    1715                          1720                          1725


Pro Asp  Cys Asp Pro Asp Lys  Asp His Pro Gly Ser  Ser Val Lys
    1730                          1735                          1740


Gly Asp  Cys Gly Asn Pro Ser  Val Gly Ile Phe Phe  Phe Val Ser
    1745                          1750                          1755


Tyr Ile  Ile Ile Ser Phe Leu  Val Val Leu Asn Met  Tyr Ile Ala
    1760                          1765                          1770


Val Ile  Leu Glu Asn Phe Ser  Val Ala Thr Glu Glu  Ser Ala Glu
    1775                          1780                          1785


Pro Leu  Ser Glu Asp Asp Phe  Glu Met Phe Tyr Glu  Val Trp Glu
    1790                          1795                          1800


Lys Phe  Asp Pro Asp Ala Thr  Gln Phe Ile Glu Phe  Ala Lys Leu
    1805                          1810                          1815


Ser Asp  Phe Ala Asp Ala Leu  Asp Pro Pro Leu Leu  Ile Ala Lys
    1820                          1825                          1830


Pro Asn  Lys Val Gln Leu Ile  Ala Met Asp Leu Pro  Met Val Ser
    1835                          1840                          1845


Gly Asp  Arg Ile His Cys Leu  Asp Ile Leu Phe Ala  Phe Thr Lys
    1850                          1855                          1860


Arg Val  Leu Gly Glu Ser Gly  Glu Met Asp Ala Leu  Arg Ile Gln
    1865                          1870                          1875


Met Glu  Glu Arg Phe Met Ala  Ser Asn Pro Ser Lys  Val Ser Tyr
    1880                          1885                          1890


Glu Pro  Ile Thr Thr Thr Leu  Lys Arg Lys Gln Glu  Glu Val Ser
```

SSCP Update Sequences.ST25
      1895   1900   1905

Ala Ile Ile Ile Gln Arg Ala Tyr Arg Arg Tyr Leu Leu Lys Gln
         1910   1915   1920

Lys Val Lys Lys Val Ser Ser Ile Tyr Lys Lys Asp Lys Gly Lys
         1925   1930   1935

Glu Cys Asp Gly Thr Pro Ile Lys Glu Asp Thr Leu Ile Asp Lys
         1940   1945   1950

Leu Asn Glu Asn Ser Thr Pro Glu Lys Thr Asp Met Thr Pro Ser
         1955   1960   1965

Thr Thr Ser Pro Pro Ser Tyr Asp Ser Val Thr Lys Pro Glu Lys
         1970   1975   1980

Glu Lys Phe Glu Lys Asp Lys Ser Glu Lys Glu Asp Lys Gly Lys
         1985   1990   1995

Asp Ile Arg Glu Ser Lys Lys
         2000   2005

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Met Ala Ala Arg Gly Ser Gly Pro Arg Ala Leu Arg Leu Leu Leu Leu
1   5   10   15

Val Gln Leu Val Ala Gly Ala Leu Arg Ser Ser Arg Ala Arg Arg Ala
            20   25   30

Ala Arg Arg Gly Leu Ser Glu Pro Ser Ser Ile Ala Lys His Glu Asp
        35   40   45

Ser Leu Leu Lys Asp Leu Phe Gln Asp Tyr Glu Arg Trp Val Arg Pro
    50   55   60

Val Glu His Leu Asn Asp Lys Ile Lys Ile Lys Phe Gly Leu Ala Ile
65   70   75   80

Ser Gln Leu Val Asp Val Asp Glu Lys Asn Gln Leu Met Thr Thr Asn
                85   90   95

Val Trp Leu Lys Gln Glu Trp Ile Asp Val Lys Leu Arg Trp Asn Pro
            100   105   110

Asp Asp Tyr Gly Gly Ile Lys Val Ile Arg Val Pro Ser Asp Ser Ser
        115   120   125

SSCP Update Sequences.ST25

```
Trp Thr Pro Asp Ile Ile Leu Phe Asp Asn Ala Asp Gly Arg Phe Glu
    130             135             140
```

```
Gly Thr Ser Thr Lys Thr Val Ile Arg Tyr Asn Gly Thr Val Thr Trp
145             150             155             160
```

```
Thr Pro Pro Ala Asn Tyr Lys Ser Ser Cys Thr Ile Asp Val Thr Phe
            165             170             175
```

```
Phe Pro Phe Asp Leu Gln Asn Cys Ser Met Lys Phe Gly Ser Trp Thr
            180             185             190
```

```
Tyr Asp Gly Ser Gln Val Asp Ile Ile Leu Glu Asp Gln Asp Val Asp
        195             200             205
```

```
Lys Arg Asp Phe Phe Asp Asn Gly Glu Trp Glu Ile Val Ser Ala Thr
    210             215             220
```

```
Gly Ser Lys Gly Asn Arg Thr Asp Ser Cys Cys Trp Tyr Pro Tyr Val
225             230             235             240
```

```
Thr Tyr Ser Phe Val Ile Lys Arg Leu Pro Leu Phe Tyr Thr Leu Phe
            245             250             255
```

```
Leu Ile Ile Pro Cys Ile Gly Leu Ser Phe Leu Thr Val Leu Val Phe
            260             265             270
```

```
Tyr Leu Pro Ser Asn Glu Gly Glu Lys Ile Cys Leu Cys Thr Ser Val
        275             280             285
```

```
Leu Val Ser Leu Thr Val Phe Leu Leu Val Ile Glu Glu Ile Ile Pro
    290             295             300
```

```
Ser Ser Ser Lys Val Ile Pro Leu Ile Gly Glu Tyr Leu Val Phe Thr
305             310             315             320
```

```
Met Ile Phe Val Thr Leu Ser Ile Met Val Thr Val Phe Ala Ile Asn
            325             330             335
```

```
Ile His His Arg Ser Ser Ser Thr His Asn Ala Met Ala Pro Leu Val
            340             345             350
```

```
Arg Lys Ile Phe Leu His Thr Leu Pro Lys Leu Leu Ser Met Arg Ser
            355             360             365
```

```
His Val Asp Arg Tyr Phe Thr Gln Lys Glu Glu Thr Glu Ser Gly Ser
    370             375             380
```

```
Gly Pro Lys Ser Ser Arg Asn Thr Leu Glu Ala Ala Leu Asp Ser Ile
385             390             395             400
```

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SSCP Update Sequences.ST25

```
Arg Tyr Ile Thr Thr His Ile Met Lys Glu Asn Asp Val Arg Glu Val
            405             410             415

Val Glu Asp Trp Lys Phe Ile Ala Gln Val Leu Asp Arg Met Phe Leu
            420             425             430

Trp Thr Phe Leu Phe Val Ser Ile Val Gly Ser Leu Gly Leu Phe Val
            435             440             445

Pro Val Ile Tyr Lys Trp Ala Asn Ile Leu Ile Pro Val His Ile Gly
    450             455             460

Asn Ala Asn Lys
465


<210>    89
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<212>    PRT
<213>    Homo sapiens

<400>    89

Met Gly Pro Ser Cys Pro Val Phe Leu Ser Phe Thr Lys Leu Ser Leu
1               5               10              15

Trp Trp Leu Leu Leu Thr Pro Ala Gly Gly Glu Glu Ala Lys Arg Pro
            20              25              30

Pro Pro Arg Ala Pro Gly Asp Pro Leu Ser Ser Pro Ser Pro Thr Ala
        35              40              45

Leu Pro Gln Gly Gly Ser His Thr Glu Thr Glu Asp Arg Leu Phe Lys
    50              55              60

His Leu Phe Arg Gly Tyr Asn Arg Trp Ala Arg Pro Val Pro Asn Thr
65              70              75              80

Ser Asp Val Val Ile Val Arg Phe Gly Leu Ser Ile Ala Gln Leu Ile
                85              90              95

Asp Val Asp Glu Lys Asn Gln Met Met Thr Thr Asn Val Trp Leu Lys
            100             105             110

Gln Glu Trp Ser Asp Tyr Lys Leu Arg Trp Asn Pro Thr Asp Phe Gly
        115             120             125

Asn Ile Thr Ser Leu Arg Val Pro Ser Glu Met Ile Trp Ile Pro Asp
    130             135             140

Ile Val Leu Tyr Asn Asn Ala Asp Gly Glu Phe Ala Val Thr His Met
145             150             155             160
```

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SSCP Update Sequences.ST25

Thr Lys Ala His Leu Phe Ser Thr Gly Thr Val His Trp Val Pro Pro
165   170   175

Ala Ile Tyr Lys Ser Ser Cys Ser Ile Asp Val Thr Phe Phe Pro Phe
180   185   190

Asp Gln Gln Asn Cys Lys Met Lys Phe Gly Ser Trp Thr Tyr Asp Lys
195   200   205

Ala Lys Ile Asp Leu Glu Gln Met Glu Gln Thr Val Asp Leu Lys Asp
210   215   220

Tyr Trp Glu Ser Gly Glu Trp Ala Ile Val Asn Ala Thr Gly Thr Tyr
225   230   235   240

Asn Ser Lys Lys Tyr Asp Cys Cys Ala Glu Ile Tyr Pro Asp Val Thr
245   250   255

Tyr Ala Phe Val Ile Arg Arg Leu Pro Leu Phe Tyr Thr Ile Asn Leu
260   265   270

Ile Ile Pro Cys Leu Leu Ile Ser Cys Leu Thr Val Leu Val Phe Tyr
275   280   285

Leu Pro Ser Asp Cys Gly Glu Lys Ile Thr Leu Cys Ile Ser Val Leu
290   295   300

Leu Ser Leu Thr Val Phe Leu Leu Leu Ile Thr Glu Ile Ile Pro Ser
305   310   315   320

Thr Ser Leu Val Ile Pro Leu Ile Gly Glu Tyr Leu Leu Phe Thr Met
325   330   335

Ile Phe Val Thr Leu Ser Ile Val Ile Thr Val Phe Val Leu Asn Val
340   345   350

His His Arg Ser Pro Ser Thr His Thr Met Pro His Trp Val Arg Gly
355   360   365

Ala Leu Leu Gly Cys Val Pro Arg Trp Leu Leu Met Asn Arg Pro Pro
370   375   380

Pro Pro Val Glu Leu Cys His Pro Leu Arg Leu Lys Leu Ser Pro Ser
385   390   395   400

Tyr His Trp Leu Glu Ser Asn Val Asp Ala Glu Glu Arg Glu Val Val
405   410   415

Val Glu Glu Glu Asp Arg Trp Ala Cys Ala Gly His Val Ala Pro Ser
420   425   430

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SSCP Update Sequences.ST25

Val Gly Thr Leu Cys Ser His Gly His Leu His Ser Gly Ala Ser Gly
        435   440   445

Pro Lys Ala Glu Ala Leu Leu Gln Glu Gly Glu Leu Leu Leu Ser Pro
        450   455   460

His Met Gln Lys Ala Leu Glu Gly Val His Tyr Ile Ala Asp His Leu
465   470   475   480

Arg Ser Glu Asp Ala Asp Ser Ser Val Lys Glu Asp Trp Lys Tyr Val
                485   490   495

Ala Met Val Ile Asp Arg Ile Phe Leu Trp Leu Phe Ile Ile Val Cys
            500   505   510

Phe Leu Gly Thr Ile Gly Leu Phe Leu Pro Pro Phe Leu Ala Gly Met
        515   520   525

Ile

<210> 90
<211> 505
<212> PRT
<213> Homo sapiens

<400> 90

Met Gly Ser Gly Pro Leu Ser Leu Pro Leu Ala Leu Ser Pro Pro Arg
1   5   10   15

Leu Leu Leu Leu Leu Leu Leu Ser Leu Leu Pro Val Ala Arg Ala Ser
            20   25   30

Glu Ala Glu His His Leu Phe Glu Arg Leu Phe Glu Asp Tyr Asn Glu
        35   40   45

Ile Ile Arg Pro Val Ala Asn Val Ser Asp Pro Val Ile Ile His Phe
    50   55   60

Glu Val Ser Met Ser Gln Leu Val Lys Val Asp Glu Val Asn Gln Ile
65   70   75   80

Met Glu Thr Asn Leu Trp Leu Lys Gln Ile Trp Asn Asp Tyr Lys Leu
                85   90   95

Lys Trp Asn Pro Ser Asp Tyr Gly Gly Ala Glu Phe Met Arg Val Pro
            100   105   110

Ala Gln Lys Ile Trp Lys Pro Asp Ile Val Leu Tyr Asn Asn Ala Val
        115   120   125

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SSCP Update Sequences.ST25

Gly Asp Phe Gln Val Asp Asp Lys Thr Lys Ala Leu Leu Lys Tyr Thr
130   135   140

Gly Glu Val Thr Trp Ile Pro Pro Ala Ile Phe Lys Ser Ser Cys Lys
145   150   155   160

Ile Asp Val Thr Tyr Phe Pro Phe Asp Tyr Gln Asn Cys Thr Met Lys
                165   170   175

Phe Gly Ser Trp Ser Tyr Asp Lys Ala Lys Ile Asp Leu Val Leu Ile
            180   185   190

Gly Ser Ser Met Asn Leu Lys Asp Tyr Trp Glu Ser Gly Glu Trp Ala
        195   200   205

Ile Ile Lys Ala Pro Gly Tyr Lys His Asp Ile Lys Tyr Asn Cys Cys
    210   215   220

Glu Glu Ile Tyr Pro Asp Ile Thr Tyr Ser Leu Tyr Ile Arg Arg Leu
225   230   235   240

Pro Leu Phe Tyr Thr Ile Asn Leu Ile Ile Pro Cys Leu Leu Ile Ser
            245   250   255

Phe Leu Thr Val Leu Val Phe Tyr Leu Pro Ser Asp Cys Gly Glu Lys
            260   265   270

Val Thr Leu Cys Ile Ser Val Leu Leu Ser Leu Thr Val Phe Leu Leu
        275   280   285

Val Ile Thr Glu Thr Ile Pro Ser Thr Ser Leu Val Ile Pro Leu Ile
    290   295   300

Gly Glu Tyr Leu Leu Phe Thr Met Ile Phe Val Thr Leu Ser Ile Val
305   310   315   320

Ile Thr Val Phe Val Leu Asn Val His Tyr Arg Thr Pro Thr Thr His
            325   330   335

Thr Met Pro Ser Trp Val Lys Thr Val Phe Leu Asn Leu Leu Pro Arg
            340   345   350

Val Met Phe Met Thr Arg Pro Thr Ser Asn Glu Gly Asn Ala Gln Lys
        355   360   365

Pro Arg Pro Leu Tyr Gly Ala Glu Leu Ser Asn Leu Asn Cys Phe Ser
    370   375   380

Arg Ala Glu Ser Lys Gly Cys Lys Glu Gly Tyr Pro Cys Gln Asp Gly
385   390   395   400

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SSCP Update Sequences.ST25

Met Cys Gly Tyr Cys His His Arg Arg Ile Lys Ile Ser Asn Phe Ser
                405   410   415

Ala Asn Leu Thr Arg Ser Ser Ser Ser Glu Ser Val Asp Ala Val Leu
            420   425   430

Ser Leu Ser Ala Leu Ser Pro Glu Ile Lys Glu Ala Ile Gln Ser Val
            435   440   445

Lys Tyr Ile Ala Glu Asn Met Lys Ala Gln Asn Glu Ala Lys Glu Ile
        450   455   460

Gln Asp Asp Trp Lys Tyr Val Ala Met Val Ile Asp Arg Ile Phe Leu
465   470   475   480

Trp Val Phe Thr Leu Val Cys Ile Leu Gly Thr Ala Gly Leu Phe Leu
                485   490   495

Gln Pro Leu Met Ala Arg Glu Asp Ala
            500   505

<210>   91
<211>   118
<212>   PRT
<213>   Homo sapiens

<400>   91

Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1   5   10   15

Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
            20   25   30

Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
        35   40   45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
    50   55   60

Gly Lys Pro Pro Gln Ala Gln Arg Leu Leu Pro Gln Ala Ala Glu Phe
65   70   75   80

Pro Leu Gln Arg Ala Gly Ala Ala Ala Arg Leu Gly Val His Leu Pro
                85   90   95

Arg Leu Arg Val Pro Pro Gly Phe Leu Leu Pro Arg Ala Val Cys Val
            100   105   110

Phe His His Gln Gly Val
            115

<210>   92

SSCP Update Sequences.ST25

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<211>    854
<212>    PRT
<213>    Homo sapiens

<400>    92

Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1               5                   10                  15

Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
                20              25              30

Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
            35                  40                  45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
    50              55                  60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65              70                  75                  80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
                85                  90                  95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
                100             105             110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
            115             120             125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
    130                 135             140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145                 150             155             160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
                165             170             175

Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
                180             185             190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
            195             200             205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
    210             215             220

Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225             230             235             240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
                245             250             255
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SSCP Update Sequences.ST25

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Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
            260             265             270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
        275             280             285

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
    290             295             300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305             310             315             320

Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
            325             330             335

Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
            340             345             350

Gly Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
            355             360             365

Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
    370             375             380

Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385             390             395             400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Glu Pro Ser Pro Ser
            405             410             415

Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg Gly Val
            420             425             430

Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg Arg Ser
            435             440             445

Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val Pro Lys
    450             455             460

Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe Arg Ile
465             470             475             480

Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu Pro Gly
            485             490             495

Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val Thr Glu
            500             505             510

Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys Val Met
    515             520             525
```

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SSCP Update Sequences.ST25

Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg Pro Tyr
530   535   540

Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu Asp Met
545   550   555   560

Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Val Asp Gln Ile Val Gly
565   570   575

Arg Gly Pro Ala Ile Thr Asp Lys Asp Arg Thr Lys Gly Pro Ala Glu
580   585   590

Ala Glu Leu Pro Glu Asp Pro Ser Met Met Gly Arg Leu Gly Lys Val
595   600   605

Glu Lys Gln Val Leu Ser Met Glu Lys Lys Leu Asp Phe Leu Val Asn
610   615   620

Ile Tyr Met Gln Arg Met Gly Ile Pro Pro Thr Glu Thr Glu Ala Tyr
625   630   635   640

Phe Gly Ala Lys Glu Pro Glu Pro Ala Pro Pro Tyr His Ser Pro Glu
645   650   655

Asp Ser Arg Glu His Val Asp Arg His Gly Cys Ile Val Lys Ile Val
660   665   670

Arg Ser Ser Ser Ser Thr Gly Gln Lys Asn Phe Ser Ala Pro Pro Ala
675   680   685

Ala Pro Pro Val Gln Cys Pro Pro Ser Thr Ser Trp Gln Pro Gln Ser
690   695   700

His Pro Arg Gln Gly His Gly Thr Ser Pro Val Gly Asp His Gly Ser
705   710   715   720

Leu Val Arg Ile Pro Pro Pro Ala His Glu Arg Ser Leu Ser Ala
725   730   735

Tyr Gly Gly Gly Asn Arg Ala Ser Met Glu Phe Leu Arg Gln Glu Asp
740   745   750

Thr Pro Gly Cys Arg Pro Pro Glu Gly Thr Leu Arg Asp Ser Asp Thr
755   760   765

Ser Ile Ser Ile Pro Ser Val Asp His Glu Glu Leu Glu Arg Ser Phe
770   775   780

Ser Gly Phe Ser Ile Ser Gln Ser Lys Glu Asn Leu Asp Ala Leu Asn
785   790   795   800

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SSCP Update Sequences.ST25

Ser Cys Tyr Ala Ala Val Ala Pro Cys Ala Lys Val Arg Pro Tyr Ile
              805   810   815

Ala Glu Gly Glu Ser Asp Thr Asp Ser Asp Leu Cys Thr Pro Cys Gly
              820   825   830

Pro Pro Pro Arg Ser Ala Thr Gly Glu Gly Pro Phe Gly Asp Val Gly
              835   840   845

Trp Ala Gly Pro Arg Lys
    850

<210> 93
<211> 429
<212> PRT
<213> Homo sapiens

<400> 93

Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1   5   10   15

Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
              20   25   30

Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
              35   40   45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
              50   55   60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
              85   90   95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
              100   105   110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
              115   120   125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
              130   135   140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
              165   170   175

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SSCP Update Sequences.ST25

Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
            180   185   190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
        195   200   205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
        210   215   220

Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
            245   250   255

Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
            260   265   270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
        275   280   285

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
    290   295   300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305   310   315   320

Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
            325   330   335

Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
        340   345   350

Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
        355   360   365

Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
    370   375   380

Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Glu Pro Ser Pro Ser
            405   410   415

Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro
            420   425

<210>   94
<211>   854
<212>   PRT

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SSCP Update Sequences.ST25

<213>   Homo sapiens

<400>   94

Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1   5   10   15

Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
                20   25   30

Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
        35   40   45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
    50   55   60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65   70   75   80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
                85   90   95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
            100   105   110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
        115   120   125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
    130   135   140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145   150   155   160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
                165   170   175

Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
                180   185   190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
        195   200   205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
    210   215   220

Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
                245   250   255

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SSCP Update Sequences.ST25

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Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
            260             265             270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
        275             280             285

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
    290             295             300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305             310             315             320

Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
            325             330             335

Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
            340             345             350

Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
        355             360             365

Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
    370             375             380

Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385             390             395             400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Glu Pro Ser Pro Ser
            405             410             415

Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg Gly Val
            420             425             430

Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg Arg Ser
    435             440             445

Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val Pro Lys
    450             455             460

Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe Arg Ile
465             470             475             480

Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu Pro Gly
            485             490             495

Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val Thr Glu
            500             505             510

Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys Val Met
    515             520             525
```

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SSCP Update Sequences.ST25

```
Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg Pro Tyr
    530             535             540


Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu Asp Met
545             550             555             560


Leu Ser Arg Ile Lys Ser Leu Gln Ser Ser Val Asp Gln Ile Val Gly
                565             570             575


Arg Gly Pro Ala Ile Thr Asp Lys Asp Arg Thr Lys Gly Pro Ala Glu
            580             585             590


Ala Glu Leu Pro Glu Asp Pro Ser Met Met Gly Arg Leu Gly Lys Val
        595             600             605


Glu Lys Gln Val Leu Ser Met Glu Lys Lys Leu Asp Phe Leu Val Asn
    610             615             620


Ile Tyr Met Gln Arg Met Gly Ile Pro Pro Thr Glu Thr Glu Ala Tyr
625             630             635             640


Phe Gly Ala Lys Glu Pro Glu Pro Ala Pro Pro Tyr His Ser Pro Glu
                645             650             655


Asp Ser Arg Glu His Val Asp Arg His Gly Cys Ile Val Lys Ile Val
            660             665             670


Arg Ser Ser Ser Ser Thr Gly Gln Lys Asn Phe Ser Ala Pro Pro Ala
        675             680             685


Ala Pro Pro Val Gln Cys Pro Pro Ser Thr Ser Trp Gln Pro Gln Ser
    690             695             700


His Pro Arg Gln Gly His Gly Thr Ser Pro Val Gly Asp His Gly Ser
705             710             715             720


Leu Val Arg Ile Pro Pro Pro Ala His Glu Arg Ser Leu Ser Ala
                725             730             735


Tyr Gly Gly Gly Asn Arg Ala Ser Met Glu Phe Leu Arg Gln Glu Asp
            740             745             750


Thr Pro Gly Cys Arg Pro Pro Glu Gly Thr Leu Arg Asp Ser Asp Thr
        755             760             765


Ser Ile Ser Ile Pro Ser Val Asp His Glu Glu Leu Glu Arg Ser Phe
770             775             780


Ser Gly Phe Ser Ile Ser Gln Ser Lys Glu Asn Leu Asp Ala Leu Asn
785             790             795             800
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SSCP Update Sequences.ST25

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Ser Cys Tyr Ala Ala Val Ala Pro Cys Ala Lys Val Arg Pro Tyr Ile
              805              810              815

Ala Glu Gly Glu Ser Asp Thr Asp Ser Asp Leu Cys Thr Pro Cys Gly
              820              825              830

Pro Pro Pro Arg Ser Ala Thr Gly Glu Gly Pro Phe Gly Asp Val Gly
              835              840              845

Trp Ala Gly Pro Arg Lys
              850
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<210> 95
<211> 854
<212> PRT
<213> Homo sapiens

<400> 95

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Met Val Gln Lys Ser Arg Asn Gly Gly Val Tyr Pro Gly Pro Ser Gly
1               5               10              15

Glu Lys Lys Leu Lys Val Gly Phe Val Gly Leu Asp Pro Gly Ala Pro
              20              25              30

Asp Ser Thr Arg Asp Gly Ala Leu Leu Ile Ala Gly Ser Glu Ala Pro
              35              40              45

Lys Arg Gly Ser Ile Leu Ser Lys Pro Arg Ala Gly Gly Ala Gly Ala
        50              55              60

Gly Lys Pro Pro Lys Arg Asn Ala Phe Tyr Arg Lys Leu Gln Asn Phe
65              70              75              80

Leu Tyr Asn Val Leu Glu Arg Pro Arg Gly Trp Ala Phe Ile Tyr His
              85              90              95

Ala Tyr Val Phe Leu Leu Val Phe Ser Cys Leu Val Leu Ser Val Phe
              100             105             110

Ser Thr Ile Lys Glu Tyr Glu Lys Ser Ser Glu Gly Ala Leu Tyr Ile
        115             120             125

Leu Glu Ile Val Thr Ile Val Val Phe Gly Val Glu Tyr Phe Val Arg
        130             135             140

Ile Trp Ala Ala Gly Cys Cys Cys Arg Tyr Arg Gly Trp Arg Gly Arg
145             150             155             160

Leu Lys Phe Ala Arg Lys Pro Phe Cys Val Ile Asp Ile Met Val Leu
              165             170             175

Ile Ala Ser Ile Ala Val Leu Ala Ala Gly Ser Gln Gly Asn Val Phe
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SSCP Update Sequences.ST25
             180   185   190

Ala Thr Ser Ala Leu Arg Ser Leu Arg Phe Leu Gln Ile Leu Arg Met
        195   200   205

Ile Arg Met Asp Arg Arg Gly Gly Thr Trp Lys Leu Leu Gly Ser Val
    210   215   220

Val Tyr Ala His Ser Lys Glu Leu Val Thr Ala Trp Tyr Ile Gly Phe
225   230   235   240

Leu Cys Leu Ile Leu Ala Ser Phe Leu Val Tyr Leu Ala Glu Lys Gly
            245   250   255

Glu Asn Asp His Phe Asp Thr Tyr Ala Asp Ala Leu Trp Trp Gly Leu
            260   265   270

Ile Thr Leu Thr Thr Ile Gly Tyr Gly Asp Lys Tyr Pro Gln Thr Trp
        275   280   285

Asn Gly Arg Leu Leu Ala Ala Thr Phe Thr Leu Ile Gly Val Ser Phe
    290   295   300

Phe Ala Leu Pro Ala Gly Ile Leu Gly Ser Gly Phe Ala Leu Lys Val
305   310   315   320

Gln Glu Gln His Arg Gln Lys His Phe Glu Lys Arg Arg Asn Pro Ala
            325   330   335

Ala Gly Leu Ile Gln Ser Ala Trp Arg Phe Tyr Ala Thr Asn Leu Ser
            340   345   350

Arg Thr Asp Leu His Ser Thr Trp Gln Tyr Tyr Glu Arg Thr Val Thr
        355   360   365

Val Pro Met Tyr Ser Ser Gln Thr Gln Thr Tyr Gly Ala Ser Arg Leu
    370   375   380

Ile Pro Pro Leu Asn Gln Leu Glu Leu Leu Arg Asn Leu Lys Ser Lys
385   390   395   400

Ser Gly Leu Ala Phe Arg Lys Asp Pro Pro Glu Pro Ser Pro Ser
            405   410   415

Gln Lys Val Ser Leu Lys Asp Arg Val Phe Ser Ser Pro Arg Gly Val
            420   425   430

Ala Ala Lys Gly Lys Gly Ser Pro Gln Ala Gln Thr Val Arg Arg Ser
        435   440   445

Pro Ser Ala Asp Gln Ser Leu Glu Asp Ser Pro Ser Lys Val Pro Lys
                              Page 231

SSCP Update Sequences.ST25
      450   455   460

Ser Trp Ser Phe Gly Asp Arg Ser Arg Ala Arg Gln Ala Phe Arg Ile
465   470   475   480

Lys Gly Ala Ala Ser Arg Gln Asn Ser Glu Glu Ala Ser Leu Pro Gly
                  485   490   495

Glu Asp Ile Val Asp Asp Lys Ser Cys Pro Cys Glu Phe Val Thr Glu
                  500   505   510

Asp Leu Thr Pro Gly Leu Lys Val Ser Ile Arg Ala Val Cys Val Met
          515   520   525

Arg Phe Leu Val Ser Lys Arg Lys Phe Lys Glu Ser Leu Arg Pro Tyr
      530   535   540

Asp Val Met Asp Val Ile Glu Gln Tyr Ser Ala Gly His Leu Asp Met
545   550   555   560

Leu Ser Arg Ile Lys Ser Leu Gln Ser Arg Val Asp Gln Ile Val Gly
              565   570   575

Arg Gly Pro Ala Ile Thr Asp Lys Asp Arg Thr Lys Gly Pro Ala Glu
              580   585   590

Ala Glu Leu Pro Glu Asp Pro Ser Met Met Gly Arg Leu Gly Lys Val
      595   600   605

Glu Lys Gln Val Leu Ser Met Glu Lys Lys Arg Asp Phe Leu Val Asn
    610   615   620

Ile Tyr Met Gln Arg Met Gly Ile Pro Pro Thr Glu Thr Glu Ala Tyr
625   630   635   640

Phe Gly Ala Lys Glu Pro Glu Pro Ala Pro Pro Tyr His Ser Pro Glu
              645   650   655

Asp Ser Arg Glu His Val Asp Arg His Gly Cys Ile Val Lys Ile Val
          660   665   670

Arg Ser Ser Ser Ser Thr Gly Gln Lys Asn Phe Ser Ala Pro Pro Ala
      675   680   685

Ala Pro Pro Val Gln Cys Pro Pro Ser Thr Ser Trp Gln Pro Gln Ser
      690   695   700

His Pro Arg Gln Gly His Gly Thr Ser Pro Val Gly Asp His Gly Ser
705   710   715   720

Leu Val Arg Ile Pro Pro Pro Pro Ala His Glu Arg Ser Leu Ser Ala
                          Page 232

SSCP Update Sequences.ST25
              725   730   735

Tyr Gly Gly Gly Asn Arg Ala Ser Met Glu Phe Leu Arg Gln Glu Asp
            740   745   750

Thr Pro Gly Cys Arg Pro Pro Glu Gly Thr Leu Arg Asp Ser Asp Thr
            755   760   765

Ser Ile Ser Ile Pro Ser Val Asp His Glu Glu Leu Glu Arg Ser Phe
    770   775   780

Ser Gly Phe Ser Ile Ser Gln Ser Lys Glu Asn Leu Asp Ala Leu Asn
785   790   795   800

Ser Cys Tyr Ala Ala Val Ala Pro Cys Ala Lys Val Arg Pro Tyr Ile
            805   810   815

Ala Glu Gly Glu Ser Asp Thr Asp Ser Asp Leu Cys Thr Pro Cys Gly
            820   825   830

Pro Pro Pro Arg Ser Ala Thr Gly Glu Gly Pro Phe Gly Asp Val Gly
            835   840   845

Trp Ala Gly Pro Arg Lys
    850

A.	CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]:   C12Q 1/68, C12N 15/01, A61K 39/395 CO7K14/47

According to International Patent Classification (IPC) or to both national classification and IPC

B.	FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See electronic databases

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
See electronic databases

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPIDS, CA Medline. SCN1A, polymorphism/mutation/SNP, epilepsy/disease/febrile seizure

C.	DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Fujiwara T et al. Mutations of sodium channel α subunit type 1 (SCN1A) in intractable childhood epilepsies with frequent generalized tonic-clonic seizures. Brain, 2003. 126: 531-546	
A	Nabbout R et al. Spectrum of SCN1A mutations in severe myoclonic epilepsy of infancy. Neurology, 2003 Jun 24. 60(12):1961-7.	
A	WO 2003/008574 A1 (BIONOMICS LIMITED) 30 January 2003	
A	WO 2002/06521 A1 (BIONOMICS LIMITED) 24 January 2002	
A	WO 2002/50096 A1 ((BIONOMICS LIMITED) 27 June 2002	

	Further documents are listed in the continuation of Box C	[X]	See patent family annex

*	Special categories of cited documents:		
"A"	document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E"	earlier application or patent but published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
28 September 2004	7 OCT 2004

Name and mailing address of the ISA/AU	Authorized officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	**Gillian Allen** Telephone No : (02) 6283 2266

Box No. II	**Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:

   because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims No **65 and 66**

   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

   The scope of these claims is so unclear that no meaningful search can be performed.

3. ☐ Claims Nos.:

   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a)

Box No. III	**Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:
   The ISA found that the claims were directed to multiple invention

   See Supplemental Box III for details

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by:

   Claims **1-16 19-27, 29-64, 67-85** in so far as they are directed to polymorphisms in SCN1A

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Supplemental Box
(To be used when the space in any of Boxes I to VIII is not sufficient)

Continuation of Box No: III

The present claims are to 72 different mutations in 18 different ion channel genes, the mutant genes and their encoded polypeptides and antibodies thereto, and to uses of these in diagnosis or therapy.

The unifying feature of the claimed inventions is a disease-associated mutation of an ion channel gene. However, ion channel disease-associated mutations are known for every one of the ion channels of the claims, ie SCN, CHRN, KCQN, and GABR.

Therefore, since the unifying feature of the different mutations is not novel, it cannot be accepted as a special technical feature that would unite the claims.

There are therefore 72 separate inventions claimed.

However, this office believes that all claimed mutations of any one of the claimed genes could be searched without undue effort, and has chose to search the claims in so far as they are directed to polymorphisms of SCN1A

INTERNATIONAL SEARCH REPORT

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Member		
WO 2003/008574	CA 2454073		
	EP 1407013		
WO 2002/06521	AU 200172218		
WO 2002/50096	AU 200216826		
	EP 1351968		
	US 2004110706		
	JP 2004515252T		

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX